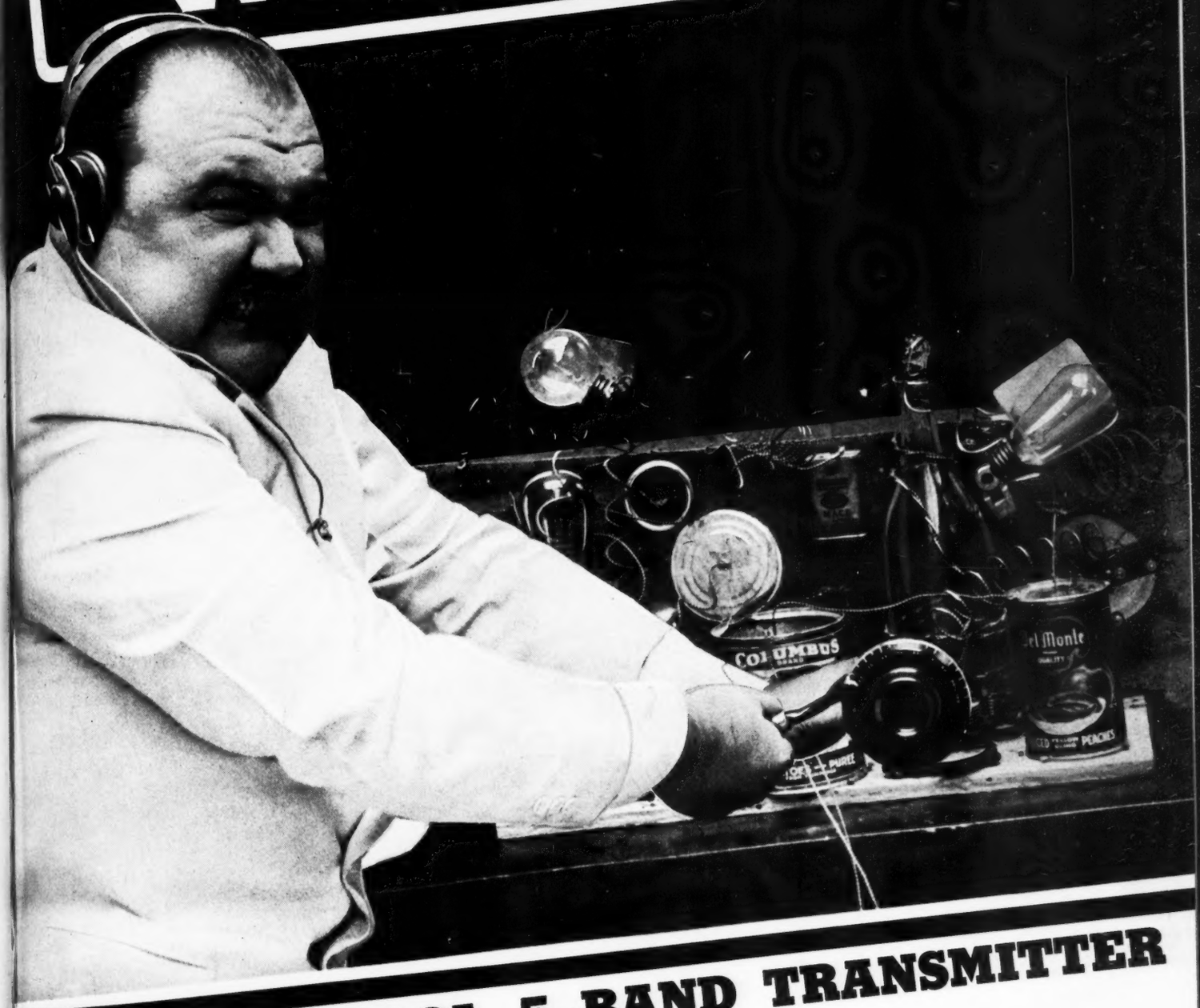
RADIO NEWS



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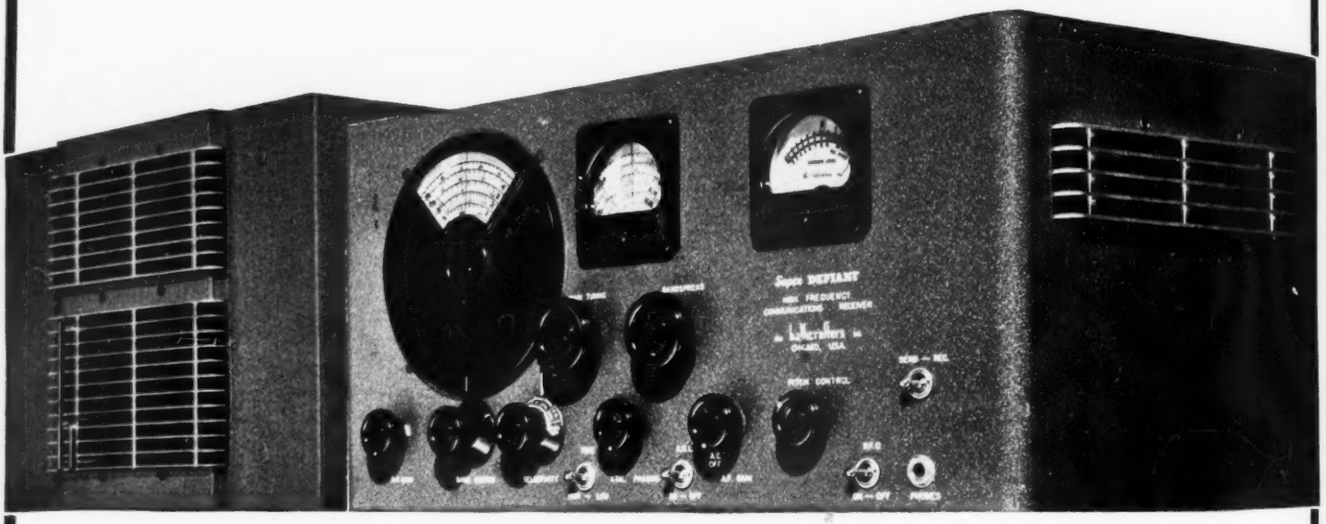

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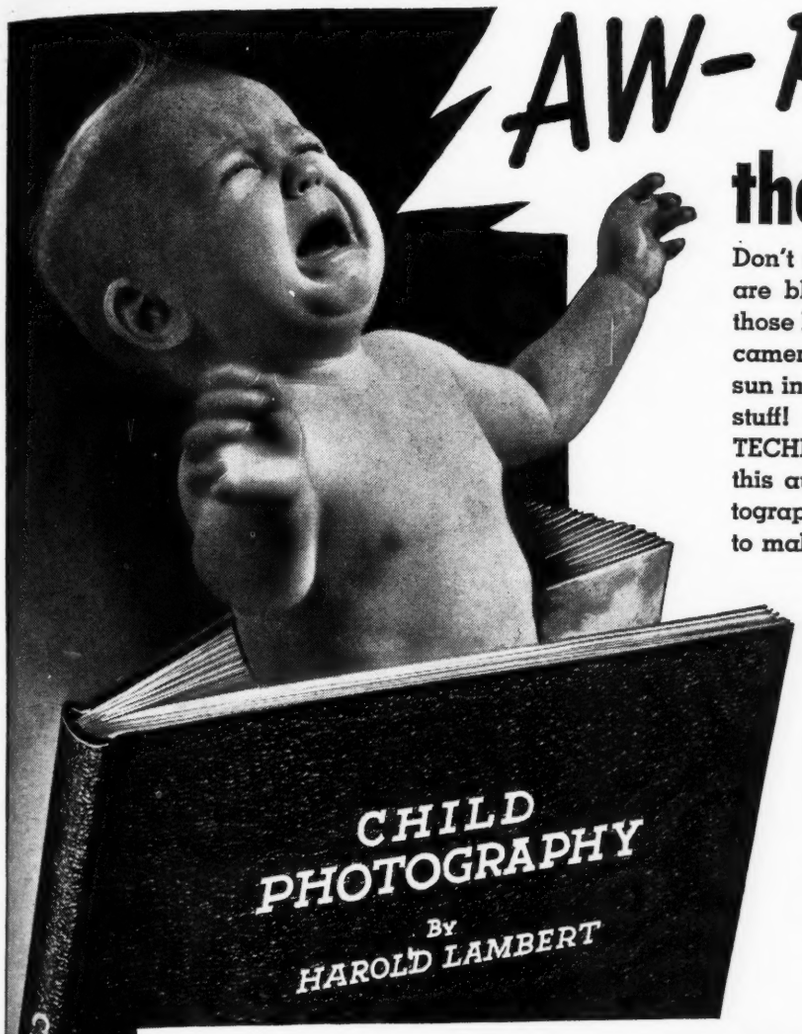

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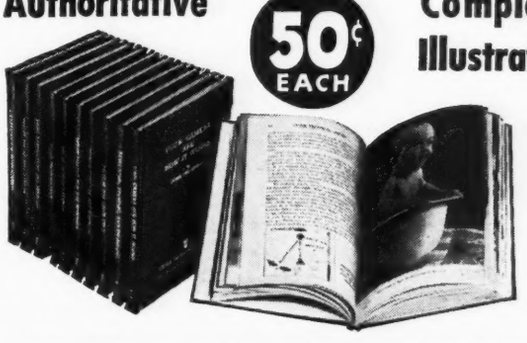

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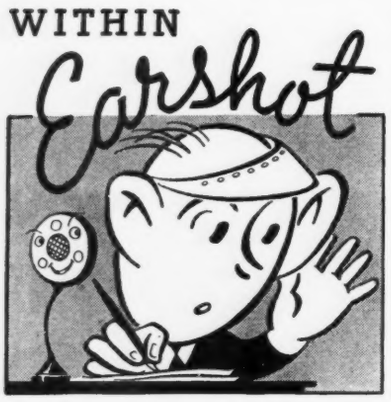

OF THE EDITOR

AS foreign governments close in more and more on their amateurs, we cannot help but feel that the patriotic motives which underlie our 50,000 hams' ideals are a reality—a tangible—and that the fundamental concept of our government, and hence our people, is to trust each other. There is no more patriotic group that our amateurs. In spite of their general garrulousness, their apparent worship of the great *Hertzian* god, their love of this country and what it stands for tightens the throat, and makes sure the statement credited to President Roosevelt's secretary, Steve Early, that "You needn't worry about the amateurs. They'll keep their own bands clearer of spies, subversive dogmas and propaganda, than the F.C.C. could ever do." Long live the American Ham—the personification of Democracy!

WHILE we're sitting here contemplating seven inches of snow, we think it would be swell to have an *All-Americas Ham Convention,* or an *R.M.A. Show,* or a *Serviceman's Convention,* in say February in Miami or New Orleans.

Not only is one Convention per year much too little—it's such a long wait between shows, but we believe that with radio moving so fast, *two* shows per year would be welcome.

And then, Miami is so very swell in the Winter!

FREE suggestion to the frequency modulation lads. Why try to ram your new interference-free type of radio at an unprepared public? The airlines, with interference a grave problem would be very happy to use your product if it can help them. Actually, FM can do a better job for the airlines than AM is now doing, so why not tackle the flying boys; they'll be waiting for you!—with open arms!

"SAFETY" can mean but one thing to us. It does not occur to the constructor that if he do this or that, *then* he is "safe." Safety from unwilling electrocution should be so inherent, so engineered into a rig, that

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RADIO NEWS

Including Articles on POPULAR TELEVISION

The Magazine for the radio amateur experimenter, serviceman & dealer

VOL. 23, NO. 3

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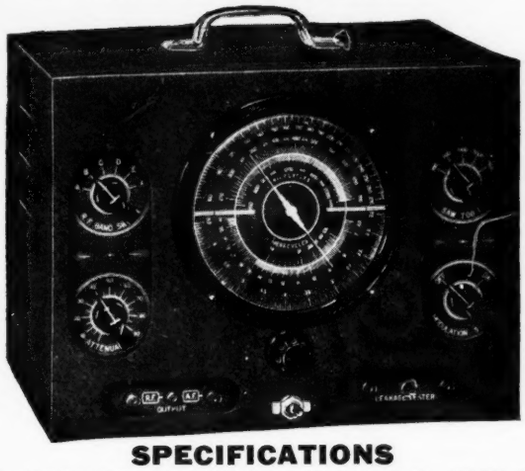
SIGNAL GENERATOR
WITH AUDIO FREQUENCIES



SPECIFICATIONS

Combination R.F. and Audio Signal Generator, R.F.—100 Kc. to 100 Mc., A.F.—100-7,500 cycles. All direct reading, all by front panel switching.
R.F. and A.F. output independently obtainable alone or with A.F. (any frequency) modulating R.F.
Accuracy is within 1% on I.F. and Broadcast bands; 2% on higher frequencies.
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Giant airplane full vision, direct-reading dial.
Condenser and other leakages tested to 100 megohms.
All services on 90-130 volts A.C. or D.C. (any frequency).

Model 1130-S comes complete with tubes, test leads, carrying handle, instructions. Size 12"x9"x6½". Shipping weight 15 pounds. Our net price.. **$11.85**

THE NEW MODEL 1280
SET-TESTER
Combines Models 1240 and 1250

A complete testing laboratory in one unit, the Model 1280 combines the Models 1250 Multitester and 1240 Tube Tester. (See specifications of each below.)

- ★ **Instantaneous Snap Switches Reduce Actual Testing Time to Absolute Minimum.**
- ★ **Spare Socket and Filament Voltages Up to 120 Volts, Make the Model 1280 Obsolescence Proof.**
- ★ **Latest Design 4½" D'Arsonval Type Meter.**
- ★ **Works on 90 to 125 Volts 60 Cycles A.C.**

Even those servicemen who through past purchases know they can always get SUPER-VALUES from Superior, will be amazed and delighted when they read the specifications of this all-purpose instrument and then note the unbelievably low price. The Model 1280 features a 4½" D'Arsonval type meter for easy reading of the various scales, and in line with our new policy of stressing appearance as well as serviceability in our new 1200 line of test equipment, our Model 1280 utilizes an aluminum etched panel, designed for beauty as well as ruggedness. The primary function of an instrument is, of course, to make measurements accurately and when designing test equipment this is our first thought. However, we also appreciate the important part the appearance of an instrument plays in the impression a serviceman makes on his customers, especially on home calls. We have, therefore, paid special attention to the outward design of all of our new instruments. For instance, the panel of this Model 1280 is made of heavy-gauge aluminum and etched by a radically new process which results in a beautiful, confidence-inspiring appearance.
Model 1280 comes complete with test leads, tabular data and instructions. Shipping weight 18 pounds. Size 13"x11"x6½". Our net price **$19.95**

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THE NEW MODEL 1250
MULTITESTER

SLOPING PANEL FOR PRECISE RAPID SERVICING

Etched Aluminum Panel

Specially Designed Electronic Rectifier Enables Linear A.C. Scale, High Stability and Little or no Temperature Drift.

Here is an opportunity to acquire a Multi-Service, Precision Engineered Instrument, for less than you would have to pay for an ordinary Volt-Ohm Milliammeter. Besides making the usual volt, resistance and current measurements (both A.C. and D.C.) this unit accurately measures the CAPACITIES of mica, paper and electrolytic condensers, INDUCTANCE of coils, chokes and transformers, DECIBEL gain or loss, of power amplifiers and public address systems, WATTS output of amplifiers, receivers, etc.

SPECIFICATIONS

Complete A.C. and D.C. Voltage and Current Ranges
D.C. Voltage: — 0-15, 0-150, 0-750 volts
A.C. Voltage: — 0-15, 0-150, 0-750 volts
D.C. Current: — 0.1, 0-15, 0-150, 0-750 ma.
A.C. Current:—0-15, 0-150, 0-750 ma.
2 Resistance Ranges
0-500 ohms, 500-5 megohms
High and Low Capacity Scales .0005 to 1 mfd. and .05 to 50 mfd.
3 Decibel Ranges
—10 to +19, —10 to +38, —10 to +53
Inductance: 1 to 700 Henries
Watts: Based on 6 mw. at 0 D.B. in 500 ohms .006000 to 600 Watts

Model 1250 works on 90-120 volts 60 cycles A.C. Comes complete with test leads, tabular charts and instructions. Shipping weight 9 lbs. Size 9½"x11"x6½". Our net price..... **$11.85**

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THE NEW MODEL 1240
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Instantaneous Snap Switches Reduce Actual Testing Time to Absolute Minimum

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Tests All Tubes 1.4 to 117 Volts

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Sockets for All Tubes— No Adapters

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Superior is proud to offer the newest and most practical tube tester ever designed. Unbelievably low in price—unbelievably high in performance.

★Tests all tubes, 1.4 to 117 Volts, including 4, 5, 6, 7, 7L, octals, loctals, Bantam Jr., Peanut, single ended, floating filament, Mercury Vapor Rectifiers, the new S series, in fact, every tube designed to date.
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★Tests shorts and leakages up to 2 megohms in all tubes.
★Tests leakages and shorts in all elements **AGAINST** all elements in all tubes.
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★Latest type voltage regulator.
★Features an attractive etched aluminum panel.
★Works on 90 to 125 volts 60 cycles A.C.

Model 1240 comes complete with instructions and tabular data for every known type of receiving tube. Shipping weight 12 pounds. Size 6"x7½"x10¾". Our Net Price..... **$11.85**

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SUPERIOR INSTRUMENTS CO.
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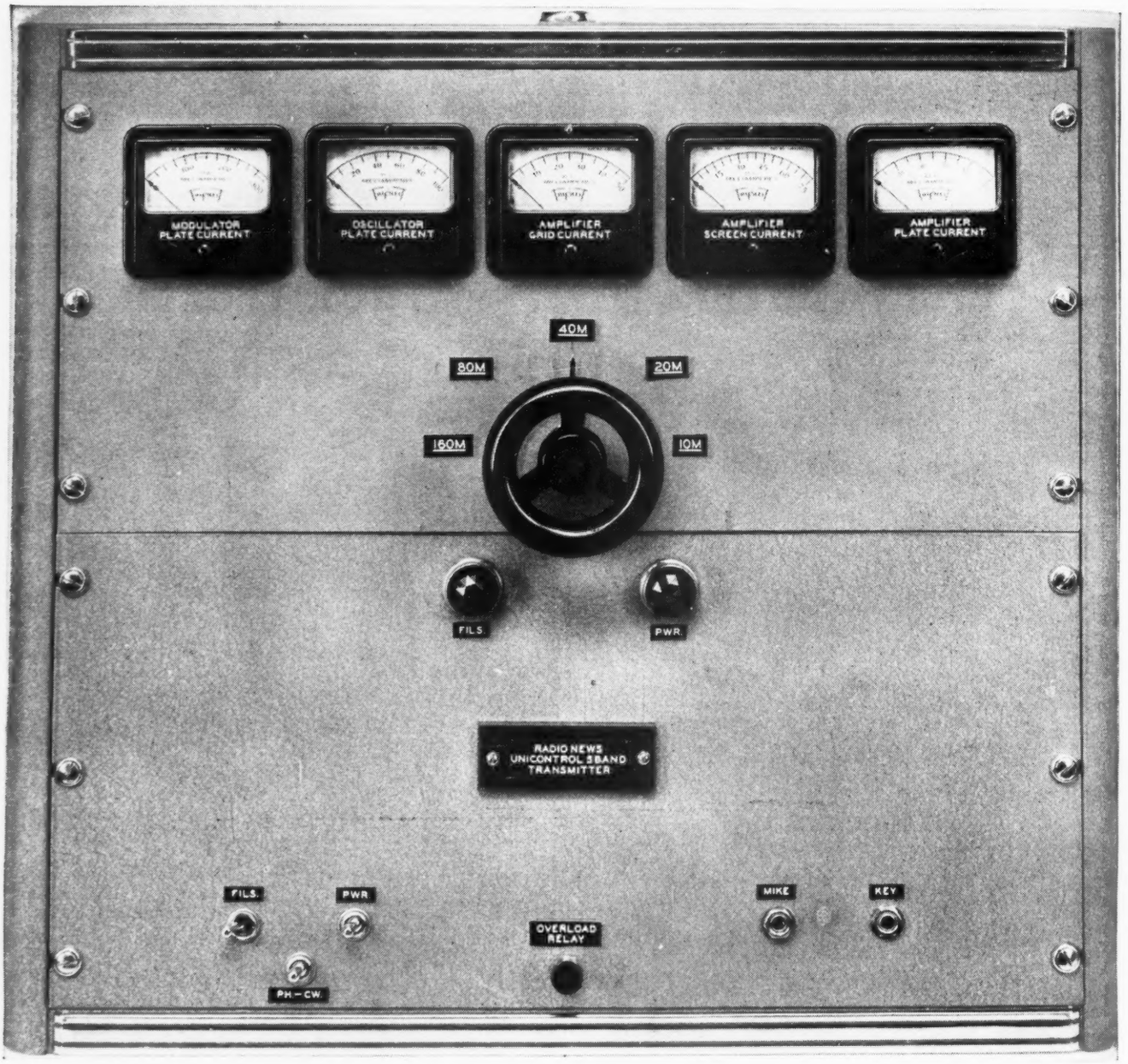
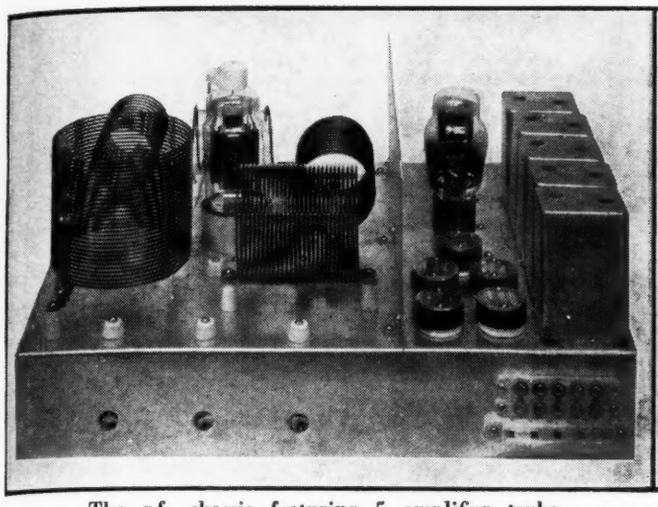
THE UNICONTROL 5-BAND TRANSMITTER

by
KARL A. KOPETZKY, W9QEA & OLIVER READ, W9ETI.
Managing Editor, RADIO NEWS — Technical Editor, RADIO NEWS

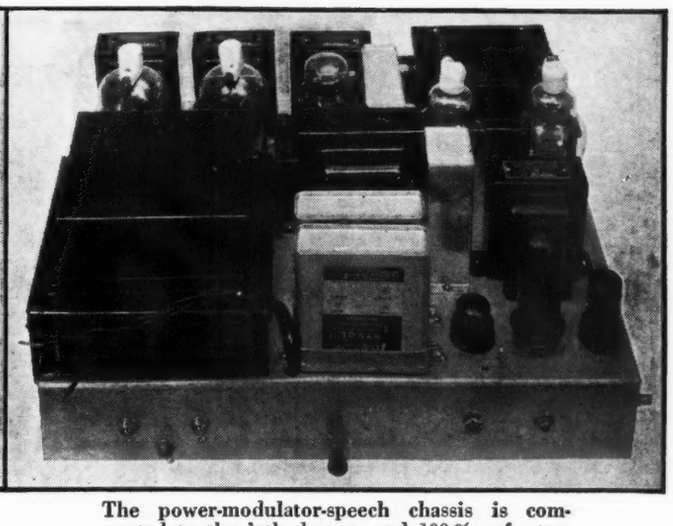
The Streamlined Version of the Ham Transmitter of 1940, featuring 5-band switching and full automatic tuning.



Designed 100% around RCA tubes, only a single control is used to switch from 160 through 10 meters. It is a "safety rig," being crystal controlled on all 5 bands, plus 200 watts output. That is 1940's transmitter!



The r.f. chassis featuring 5 amplifier tanks to the left and 5 separate xtal tanks, right.



The power-modulator-speech chassis is compacted to the 'nth degree, and 100% safe, too.

OF all phases of amateur radio, one of the most fascinating is the design of amateur transmitting equipment. This design, starting with "breadboard" and table-mounted units in about 1912 has gradually progressed through various stages to the cabinet-contained rack and panel rig of today.

At the inception of the radio amateur hobby, the ham very often led his commercial brother in the design of equipment, but more lately the amateur has apparently branched out into a division of his own, while his commercial brother has proceeded straight along the path toward a goal of compactness and ruggedness.

One has only to compare a hundred assorted "ham" transmitters with a hundred equally assorted commercial transmitters to see the wide differences that exist in the engineering minds of each of these two followers of the art. It is only natural therefore that when the authors were thinking of designing a rig for 1940, they should attempt to compact to a greater degree than had been attempted before.

There were many considerations which led to this idea. In the first place, the present ham family is more often than not housed in a small apartment where a 6′ rig standing on the floor takes up a lot of space.

The choice of such a size unit immediately limited the amount of power which would be available. However, it was planned to put the greatest amount of output on the air possible, from a unit housed in the smallest amount of space conducive at the same time of rugged and trouble-free construction. If the rig was "table-mounted," it would be best that plug-in coils be eliminated.

According to the tube manual, the RCA 828 would operate and produce an output of 200 watts from an input of 270 watts. This is good efficiency. The loss of the 50 watts output which we accepted in choosing the RCA 828 was more than overbalanced by the advantages which were offered. These were, that the tube required very little driving power, it was an extremely well-shielded tube internally, and it presented little, if any, trouble in the matter of mechanical layout.

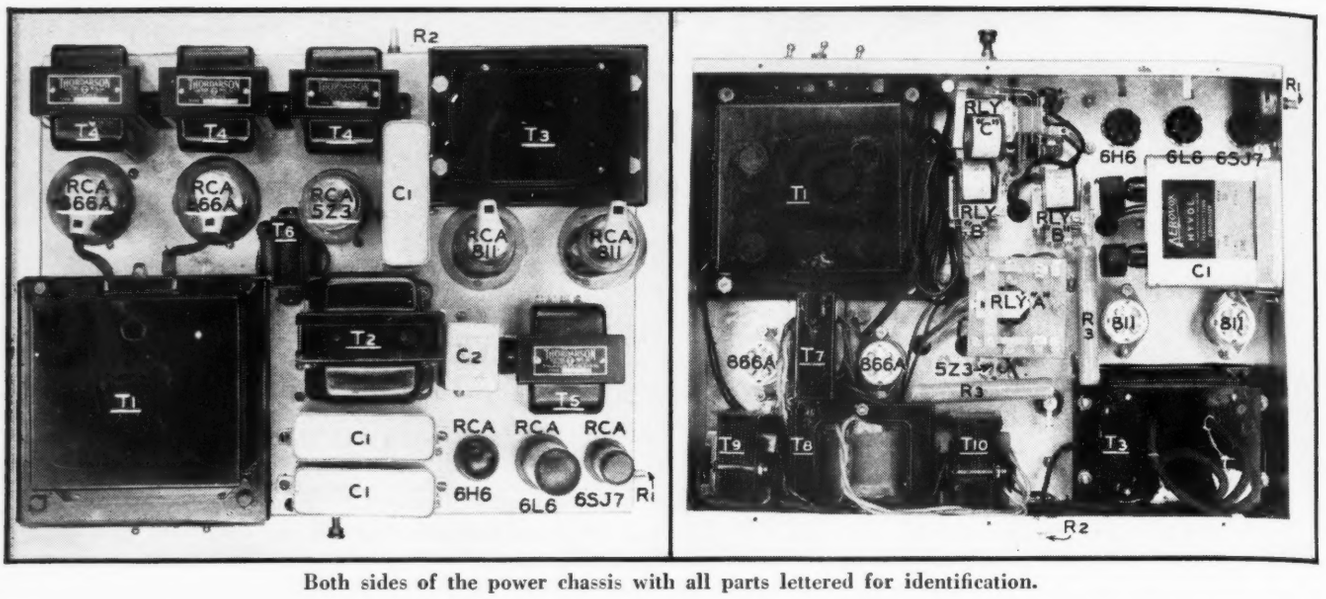
The speech equipment was simple to design since we wished to make use of the new RCA 811 Class B modulators, which would easily furnish the necessary 150 watts of audio which were required to modulate the plate and screen of the 828. Simplicity was desired as well as ruggedness and therefore only two tubes were used in this speech equipment. This setup limits hum pick-up and also makes wiring and assembling easier. We chose the RCA 6SJ7 as a speech input tube because it will operate from a crystal microphone very well, and a 6L6 Class A driver. In order to realize the fullest amount of *output* from our rig, we decided to use speech compression. By the use of an RCA 6H6 tube as a "compressor tube," we would be able to maintain a modulation level in the neighborhood of 80%.

The 828 tube should be run with a minimum of 1200 volts and a maximum of 1500 volts on the plate for efficient operation, and we found that the 811's would also operate at 1500 volts. The question then was whether we should use one or two power supplies. In looking over the manufacturers' specified sizes for 1500 volt plate transformers, the answer was immediately apparent. We would have to get by with one plate transformer. Especially good regulation was necessary since the Class B end of the high voltage would be varying from 30 ma. idling current to 200 ma. on peaks, while the Class C r.f. stage would be running a steady 180 ma. input. The average Class B current is only 100 ma. so the high voltage power supply would be required to furnish 180 ma. for the r.f. stage plus 100 ma. average current for the Class B modulators, making a total of 280 ma.

The choice now came to the size of the transmitter cabinet. We found that the average amateur loud speaker is approximately 8", while receivers varied from 8" to 10" in height and in width from 16" to 21". The average size of the average ham receiver would approximate a 19" rack and panel job by 17½" in height. This was to be the complete size of our transmitter and it was to be housed in a Par-Metal DL1713 DeLuxe cabinet to match that which housed the receiver.

The layout of the transformers was now begun. This was accomplished by cutting a piece of paper the exact size of the chassis, namely 17" x 13", and the various transmitter components which were to be mounted on, and underneath, that particular power chassis were laid out on the paper so as to get all of them into the space required and, at the same time, effect as short leads as possible between each unit. The result of this design and engineering research can be readily seen in the photograph. Please note that the power transformer and modulation transformer are laid on their side, "half-shell" style. This was found to be necessary since if the power transformer stood upright, or the modulation transformer stood upright, the overall height of the transformer plus that of the chassis would prohibit its being used behind an 8¾" panel. For the same reason we had to sink the RCA 866A rectifier tubes as well as the RCA 811 modulators.

Attention is called to the three 200 ma. chokes which are used in this transmitter. Here again commercial practices were resorted to. The choice of these three chokes came about as follows. Ordinarily, if a single power supply is required to deliver power *both* to the modulators and to the Class C r.f. stage, single chokes are used in the filtering legs and the voltage lead is split at the output side of the filter. This requires the use of chokes which will pass the combined current of the modulators and the Class C r.f. stage. Such a choke would be too large to use in this particular type of transmitter. *By splitting the input to the filter system so that each leg only carries the current required by that leg,* namely—one leg carries the current required by the modulators



Both sides of the power chassis with all parts lettered for identification.

and the other leg carries the current required by the Class C r.f. stage, smaller chokes can be used, at the same time maintaining equal filtering characteristics. In this case we were able to use 200 ma. chokes where ordinarily we would have had to have planned the use of a 350, or even a 400, ma. choke.

Considering that the receiver manufacturers have long used ganged switches for band-switching, the authors saw no reason why the same procedure could not be readily adapted to a transmitter. Certain difficulties arose. It was necessary that the switches carry the 1500 volts required in the final stage. Such a switch is that which is manufactured by the Shallcross Company, and known as its *type 532*. There are three of these switches in the transmitter. One for the exciter, one for the final r.f. stage and one for the antenna circuit. These three switches are ganged together by means of gears and chains. These are obtainable from any clock store and are the type generally used in "grandfather clocks." All of the switches excepting one have their detents removed so that only one switch is actually dragging against the chain. This is coupled to the *Coto* wheel found on the outside of the panel, directly through an insulating coupling. By rotating this wheel, all three switches alike are moved through their eleven points (although only every other point is used, giving five positions).

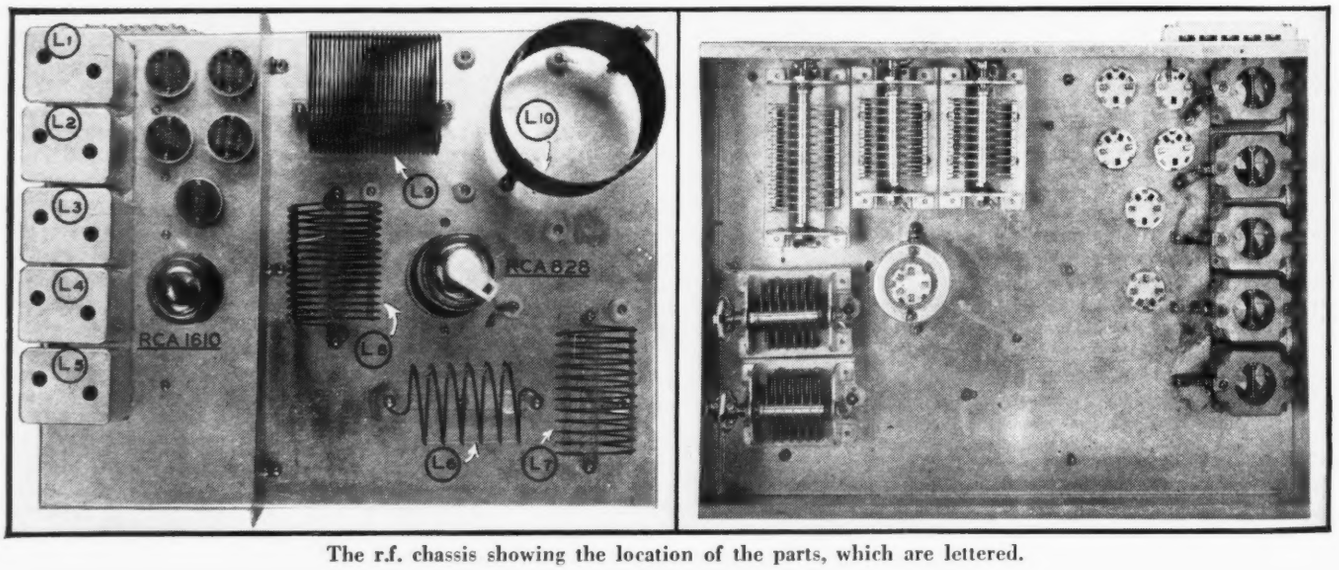
The antenna circuit is designed for a single wire feed and is fed directly from the tank through a blocking condenser. There is an extra section of the switch left over so that a different type of feed may be used if desired. With the "chain gang" switches and the extremely compact power supply, the authors found they had achieved something which more closely resembled the commercial transmitters of the present day and age.

Since the design included a pre-tuned exciter tank and pre-tuned final amplifier tanks, and since there is generally not any necessity for changing the level of the gain, especially with automatic modulation compression, it was decided not to bring out any of the tuning controls to the front of the panel, with the exception of the band-switch *Coto* wheel. This enabled the authors to create a *"uni-control"* transmitter. The sole adjustments necessary *after the transmitter has been tuned* is that of switching from band to band.

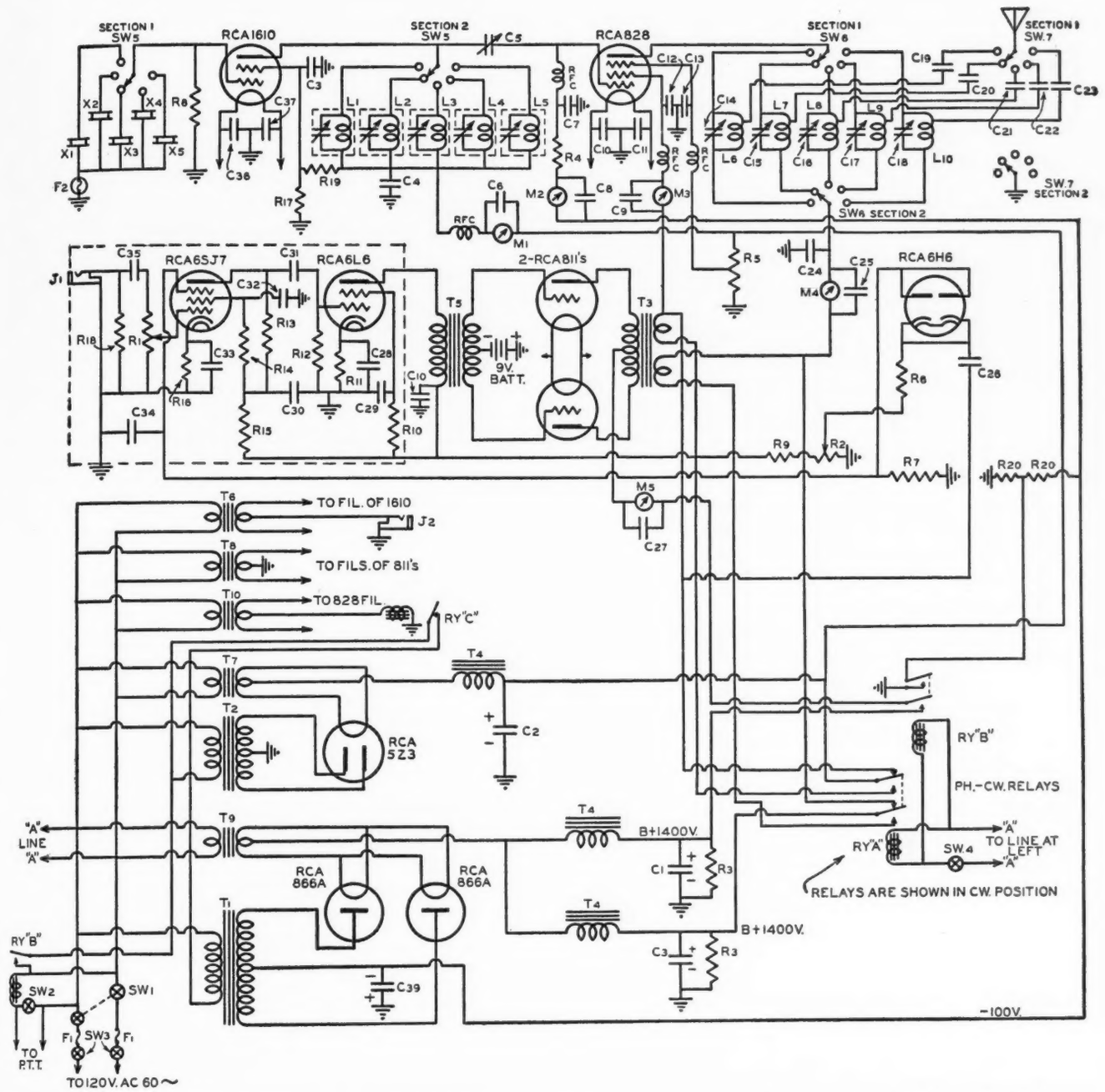
In actual test, such switchings are accomplished more rapidly than the receiving party can tune his receiver. Howsoever, some tuning adjustments were necessary, and in order to facilitate these, the tuning condensers' shafts in the final r.f. stage are "brought out," slotted, so that they may be tuned with a screw driver through holes in the *side* and *rear* of the cabinet. The same is also true of the gain control which may be reached with a screw driver in a similar fashion from the side. The compression control is in the rear since when it is once set it need not be again touched. Full information on the tuning and the construction of the r.f. section will be later included.

Before attempting construction of

(*Pse QSY to page* 63)



The r.f. chassis showing the location of the parts, which are lettered.



C_1, C_3—2 mf. 2000 v. oil-filled. Aerovox.
C_2—8 mf. 800 v. electro. Aerovox.
C_4—.005 mf. 1000 v. mica. Aerovox.
C_5—75 mmf. variable. Cardwell ZR75AS.
C_6, C_7, C_8, C_9—.002 mf. 1000 v. mica. Aerovox.
C_{10}, C_{11}, C_{36}, C_{37}—.006 mf. 1000 v. mica. Aerovox.
C_{12}, C_{13}—.002 mf. mica. Aerovox.
C_{14}, C_{15}—50 mmf. Cardwell NP5ODS.
C_{16}, C_{17}—75 mmf. Cardwell NP75DS.
C_{18}—100 mmf. Cardwell NP100DS.
C_{19}, C_{20}, C_{21}, C_{22}, C_{23}—.0025 mf. mica. Aerovox.
C_{24}—.002 mf. 5000 v. mica. Aerovox.
C_{25}—.002 mf. 1000 v. mica. Aerovox.
C_{26}—.5 mf. 200 v. paper. Aerovox.
C_{27}—.002 mf. 1000 v. mica. Aerovox.
C_{28}—10 mf. 50 v. electro. Aerovox.
C_{29}, C_{30}—4 mf. 450 v. electro. Aerovox.
C_{31}—.1 mf. 200 v. paper. Aerovox.
C_{32}—4 mf. 450 v. electro. Aerovox.
C_{33}, C_{34}—10 mf. 25 v. electro. Aerovox.
C_{35}—.02 mf. 200 v. paper. Aerovox.
C_{39}—8 mf. 450 v. electro. Aerovox.
R_1—500,000 ohm pot. Yaxley.
R_2—50,000 ohm pot. Yaxley.
R_3—100,000 ohm, 100 watt. Ohmite.
R_4—10,000 ohm, 10 w. Ohmite.
R_5—25,000 ohm, 50 w. with adj. tap. Ohmite.
R_6—10,000 ohm, 1 w. Aerovox.
R_7—100,000 ohm, 1 w. Aerovox.
R_8—40,000 ohm, 2 w. Aerovox.
R_9—50,000 ohm, 1 w. Aerovox.
R_{10}—10,000 ohm, 10 w. Ohmite.
R_{11}—500 ohm, 10 w. Ohmite.
R_{12}—500,000 ohm, 1 w. Aerovox.
R_{13}—250,000 ohm, 1 w. Aerovox.
R_{14}—1 megohm, 1 w. Aerovox.
R_{15}—50,000 ohm, 1 w. Aerovox.
R_{16}—2,000 ohm, 1 w. Aerovox.
R_{17}—30,000 ohm, 10 w. Ohmite.
R_{18}—5 megohm, ½ w. Aerovox.
R_{19}—30,000 ohm, 10 w. Ohmite.
R_{20}—500 ohm, 100 w. Ohmite.
T_1—Thordarson T19P60 plate trans. ("Converted", See Text for details)
T_2—Thordarson T19P54 plate trans.
T_3—Thordarson T19M16 modulation trans. ("Converted")‡
T_4—Thordarson T67C49 chokes (3).
T_5—Thordarson T19D02 driver trans.†
T_6—Thordarson 50F61 fil. trans.
T_7—Thordarson T19F83 fil. trans.
T_8—Thordarson T19F99 fil. trans.
T_9—Thordarson T19F90 fil. trans.
T_{10}—Thordarson T19F95 fil. trans.
Ry.A—DPDT 120 v. ac relay. Ward leonard 507-531.
Ry.B—DPST 120 v. ac relay. Guardian 21139.
Ry.C—Adjustable overload relay. Guardian X-100.
J_1, J_2—Single closed-circuit jack. Yaxley.
SW_1—DPST heavy-duty toggle switch. C-H.
$SW_{2, 4}$—SPST heavy-duty toggle switch. C-H.
SW_3—DPST door interlock switch. Bud.
SW_5—2 pole, 11 position selector switch, Shallcross 532 (xtal-tanks). See text.
SW_6—2 pole, 11 position selector switch, Shallcross 532 (both coil ends). See text.
SW_7—2 pole, 11 position selector switch, Shallcross 532 (1 section used). See text.
M_1—0-100 DCMA. Triplett Model 326.
M_2—0-50 DCMA. Triplett Model 326.
M_3—0-75 DCMA. Triplett Model 326.
M_4—0-500 DCMA. Triplett Model 326.
M_5—0-300 DCMA. Triplett Model 326.
X_1—28 mc. crystal. Hi-Power Ruby.
X_2—14 mc. crystal. Hi-Power Emerald.
X_3—7 mc. crystal. Hi-Power Emerald.
X_4—3.5 mc. crystal. Hi-Power Emerald.
X_5—1.7 mc. crystal. Hi-Power Emerald.
F_1—15 amp. 120 v. fuse.
F_2—Mazda "brown bead" pilot light.
RFC—2.5 mhy. RF Chokes. 125 ma. Millen.
Cabinet—ParMetal DeLuxe. DL 1713.
Chassis—ParMetal. 17"x13"x3" steel.
Panels—ParMetal. 19"x8¾" steel.
L_1—Millen 70225 Exciter tank.°
"5 turns, ⌀24e. 24 turns per inch."
L_2—Millen 70225 Exciter tank.°
"9 turns, ⌀24e. 24 turns per inch."
L_3—Millen 70225 Exciter tank.°
"20 turns, ⌀24e. 24 turns per inch."
L_4—Millen 70225 Exciter tank.°
"36 turns, ⌀28e. 60 turns per inch."
L_5—Millen 70225 Exciter tank.°
"90 turns, ⌀31e. close wound."
L_6—Barker & Williamson 10 BX 10 meter coil.*
L_7—Barker & Williamson 20 BX 20 meter coil.*
L_8—Barker & Williamson 40 BX 40 meter coil.*
L_9—Barker & Williamson 80 BX 80 meter coil.*
L_{10}—Barker & Williamson 160 BX 160 meter coil.*
° Condensers included by manufacturer.
* Remove banana plugs and spacers.
† Use total primary: Secondary-connect G-G terminals to 2.4-2.4 lugs. Two black leads connect together for center tap. Red lead unused.
‡ Primary: Wire No. 1 & No. 6 to plates of 811's; No. 3 & No. 4 connect together, and are primary center tap. Secondary No. 7 connects to 1500 V.D.C., No. 10 connects to R.F. Amp. tank, No. 9 connects to plus 400 V.D.C., No. 11 connects to R.F. Amp. Screen, Taps No. 2, No. 5, No. 8 & No. 12 are not used.

AS I SEE IT!

by **JOHN F. RIDER**

Dean of the Servicemen

Sales Promotion

WHAT has happened to all of the sales promotion material which at one time was offered to the serviceman by manufacturers, said sales material to be used to secure added business for the serviceman. Just today, while at lunch a man connected with the looseleaf business, entirely foreign to radio, showed us an idea which must have some merit in the radio business. It now is being placed into operation in another field and judging by the organization interested, it must be worth something because they are in a position to judge the worth of a sales promotion idea.

Incidentally we have been checking several thousand answers to a questionnaire we forwarded to about 26,000 servicemen during the past two months. Those questions which related to means and methods of advertising carried on by the service industry bring to light a tremendous preponderance of "word by mouth" advertising. Such advertising is all right as far as it goes, but it does not go far enough. By this we mean that it is not sufficiently quick acting—that too much is left to chance—that it is limited in results to the friends of those people for whom work has been done.

We appreciate that the pronounced use of such methods is based upon its economy and we have spoken to many servicemen who feel that no other method is worthwhile, with the possible exception of advertising in the classified telephone directory. In fact, even the telephone directory is not considered a really and truly profitable means, but its use has been started and many feel that since others are in they too should be included in its columns.

Although we do not have an immediate solution to offer, there must be some means of definite advertising which can be used by the service shop. It just seems impossible that all avenues are closed—that all avenues involve such financial expenditures that the effort is hopelessly beyond the financial ability of the service station owner. Many have said that the amount of newspaper space a service shop can afford to buy is so small that it can do no good. Then direct mail can be employed. Many have said that direct mail does not pay out. Is it possible that this is so because of the nature of the copy employed, the solicitation made. Any manufacturer who caters to the servicing industry and who employs a good advertising agency will do himself a great deal of good by developing some form of a brochure containing a number of new approaches in direct mail literature to be used by small organizations for distribution to the public.

Since we are not certain of how many manufacturers read this column, or for that matter, service men, it might not be a bad idea if some of the servicemen who read these lines and who would like to use direct mail methods to get business, would write to those organizations who cater to the industry and suggest some efforts along these lines. We intend taking a fling at the thing ourselves.

With convention time approaching, word by mouth advertising is too slow!

Guaranteed Service

WE speak once more about guarteed service work, but this time about collective guarantee in addition to the individual guarantee. About six or seven years ago we suggested to the ten existent national radio service organizations, that one way, if not the only way, of securing public confidence in service work was the creation of some sort of a guarantee plan, wherein in each city, servicemen as a group who might be members of the association collectively guarantee the work of the members. Two years ago we made the same suggestion to the present *RSA* group during their executive meeting in Chicago.

We have recently heard that some of the chapters of this national organization are rounding out their plans for such a collective guarantee arrangement. Frankly, the solution of service problems and the value of such national organizations lies in what they can do to get additional business for the servicing industry from the public; and ways and means of improving the relations between the serviceman and the public. Yet here and there we listen to comments from servicemen that such and such are the weaknesses of this type and that type of collective guarantee program and that a national radio service association should devote itself to the betterment of the relations between the individual serviceman and the radio industry.

Nothing is more distant from the truth. As far as we can see, there are certain specific things that a national radio service organization can accomplish with respect to the improvement of relations between the serviceman and the radio industry. Essentially this is coordination between the radio industry and the serviceman for what improvement in technical level can be accomplished by utilizing the resources, man power and facilities of the radio manufacturing industry. Next in line would be a campaign, also along educational lines to convey to the serviceman facts relating to business principles.

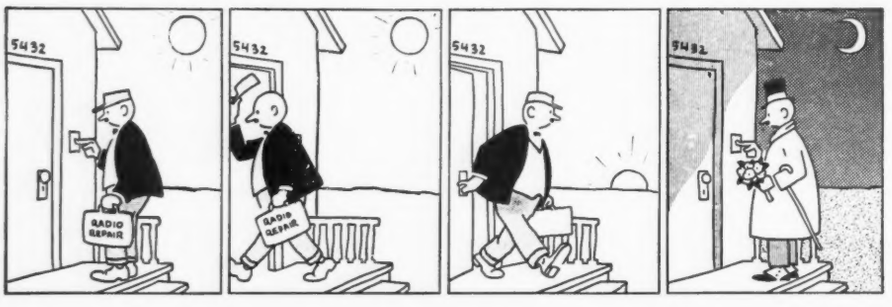
Equally important and perhaps even more so are the present efforts to procure more business for the servicemen who are members . . . The attempt to start these guarantee programs in different cities is a step along the right line because there is a vital need for public confidence. . . . Such group guarantee means public respect for the group and respect for the group means respect for the individuals in that group.

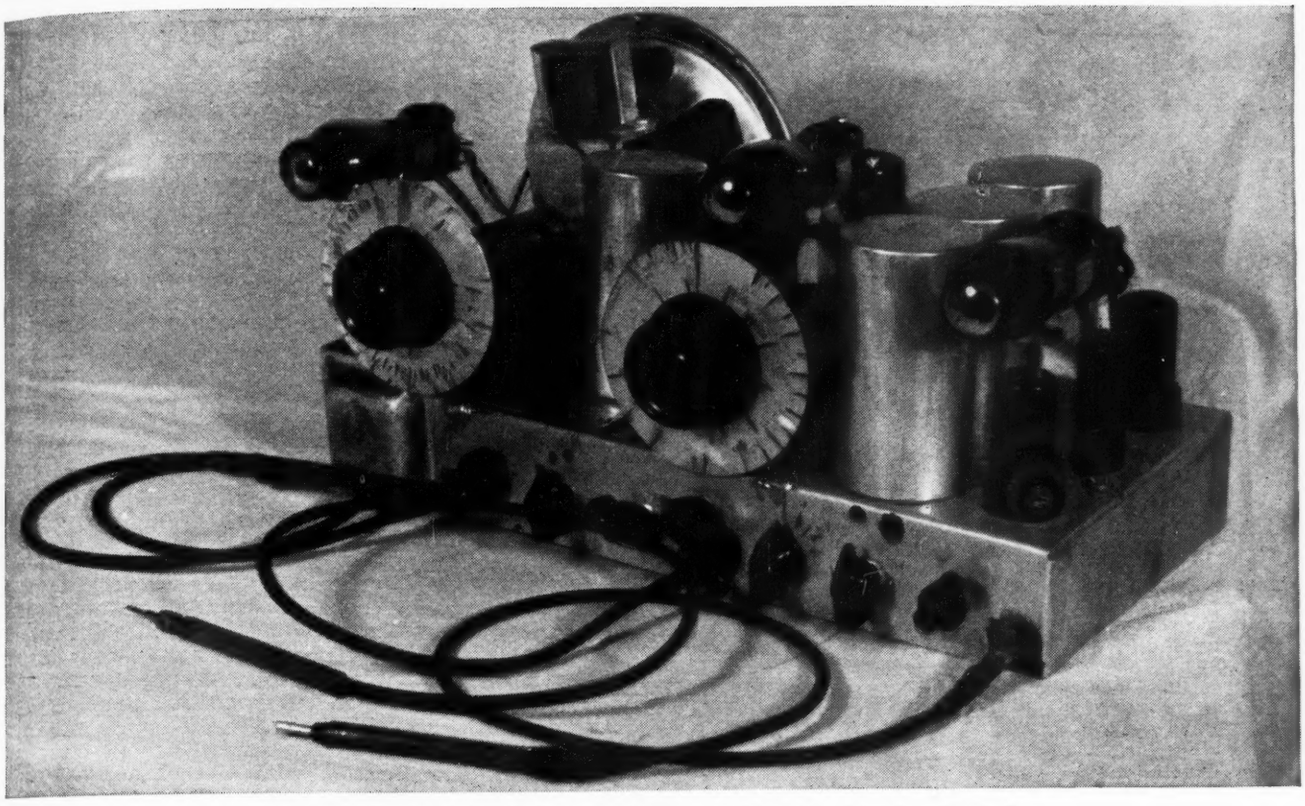
Of course there are problems and there always will be problems and even discontent, but nothing good has even been achieved without first overcoming the obstacles and smoothing out the rough spots. The fact that such group or association guarantee is a financial guarantee to the customer that the work will be well done, is not only of interest to the set owner the man who today feels that he is gambling when he calls a service man, but it is also of interest to the radio industry at large, set manufacturers as well as broadcasters.

What with the cooperation being extended by some of the broadcast stations by spot service announcements, there is every reason to believe that this helping hand will be expanded as each city has within its boundaries a group of men who offer the public that which it has needed for so long, the assurance that a service job will be well done and an established financial guarantee of a group backs the statement.

These words are not in any way intended to imply that the guarantee of the individual service shop given in the past meant very little, but it is a well known fact that such a guarantee does not bear the weight of a group. It is of significant interest to note that such group guarantees have nothing to do with price fixation, but it is also true that in each and every case where a

(*Concluded on page* 58)





The "Home-Built" Signal Chaser will look something like this when finished.

Build Your Own "SIGNAL CHASER"

by **ARTHUR B. COONEY**
Alhambra, California

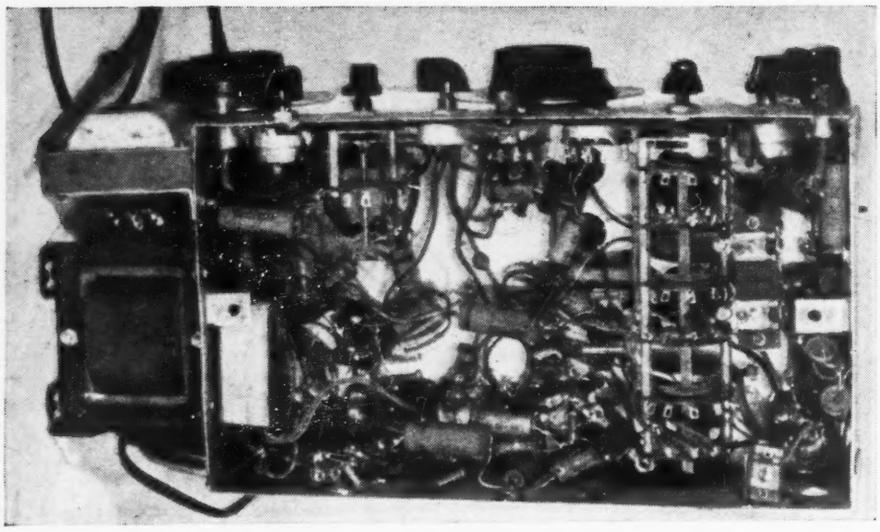
With "Signal Tracing" coming more and more into the fore, many a serviceman will want to build his own instrument.

IN recent months the radio fraternity has been discovering the advantages of the signal tracing technique in trouble shooting. This method is fundamental in that the actual radio signal is measured. A signal may be traced through a set from antenna post to voice coil merely by moving a probe. The expense of commercial signal tracing instruments has been the main factor in keeping many from enjoying the rapid and accurate diagnosis of trouble made possible by signal tracing. This article gives the plans for building a signal tracer at small cost.

A glance at the circuit diagram shows that the RF-IF portion of the signal tracer is a simple, two band, t-r-f receiver. It differs from the conventional receiver in that it lacks an antenna coil as the signal is lead to the grid of the first tube through a special probe containing a very small capacity to isolate the grid from plate currents that might be encountered in moving the probe. Note that the volume control is only on the input tube and that the switch Sw_1 cuts in condensers across the input circuit to by-pass part of the signal to ground. The steps of this capacity attenuator multiply the reading of the volume control by factors of 1, 1/10, 1/100, and 1/1000. The output of the r-f amplifier is rectified and works the 6E5 to indicate the strength of the signal. Sw_2 connects the 6SQ7 and the 6B5 and speaker for audio listening tests. The range of the RF-IF section is from 138 kc. to 465 kc. on the long wave position and from 458 kc. to 1500 kc. on the broadcast position. This allows tests at any signal level and covers all the widely used commercial i-f frequencies.

The section marked *Oscillator* is a single stage three band, high gain, r.f. stage followed by a diode rectifier and 6E5 signal indicator. It is sensitive enough to measure oscillator output voltages and covers these ranges; band 1, 550 kc.-1700 kc.; band 2, 1690 kc.-5300 kc.; band 3, 5000 kc. or 5.0 mc. to 16,000 kc. or 16.0 mc.

The audio section is used to measure and trace signals at audio frequencies. It has its own volume control and attenuator (Sw_2 and associated resistors) which has settings to multiply volume control setting by factors of 1, 1/10, 1/100, and 1/1000. The signal emerges from the speaker and also indicated on the 6E5. (*Turn the page*)

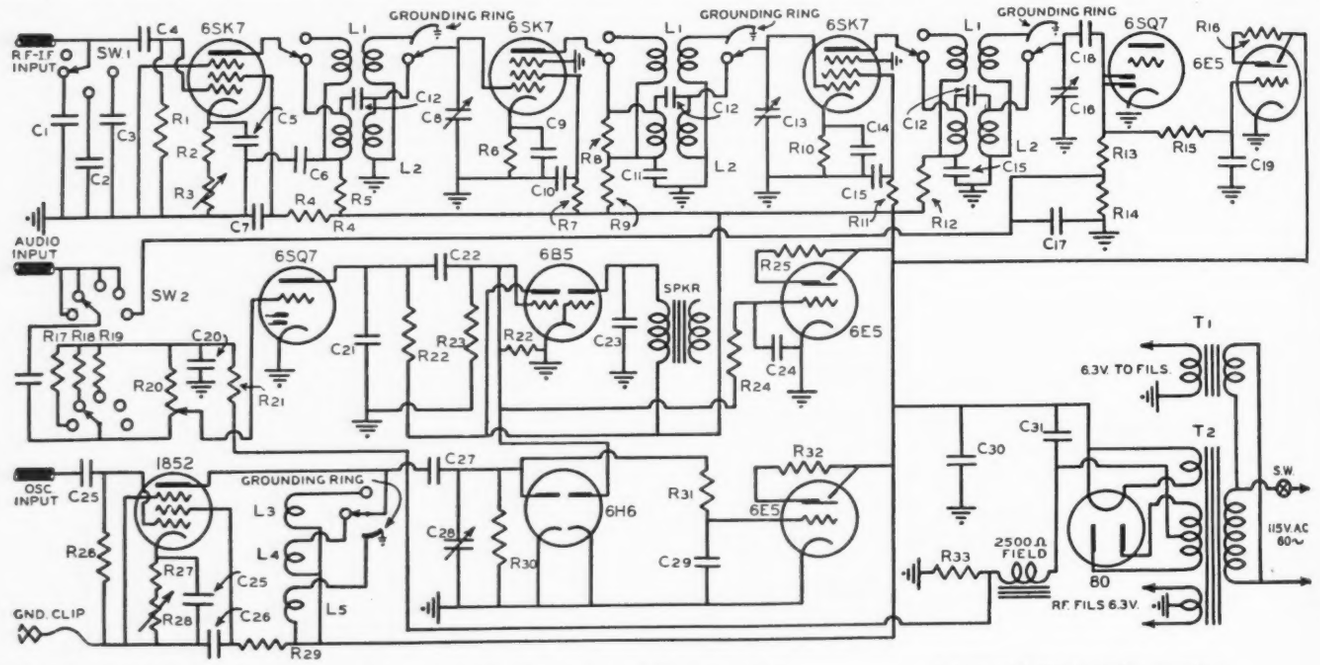


Underneath the "Signal Chaser" chassis, showing direct leads.

There is nothing freakish or tricky about the construction; using an old t-r-f set will provide many of the parts at a reasonable cost. Select a chassis so that the variable condenser, the RF-IF coils and shields, and the tubes can be mounted parallel to each other to provide short leads. The wave change switch should go under the chassis directly under the coils. Similarly the switch Sw_4 should be mounted under the chassis directly below the oscillator coil assembly. The rest of the layout can be arranged to suit one's convenience.

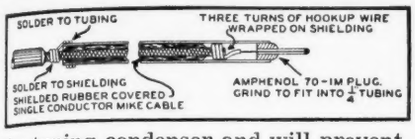
In building mount all parts and complete power supply and get the RF-IF unit before going any further. The probes are very important. Build them as shown in the diagram. The three turns of hookup wire around the probe lead serve as an input coupling capacity; be sure that the wire of the last turn can't get exposed and short on the tubing that forms the probe handle. Several coats of colored dime store nail polish will give the probe handle a nice finish. Trouble with fraying insulation on the cable of the probes can be solved by the addition of a little acetone which will unite the fibres into a solid mass.

The mounting of the RF-IF coils shown in the diagram should be followed. These coils come complete with the brackets and wiring spacers shown; just bolting them together creates the efficient coil assembly shown. The long wave coil is mounted on top as turns must be removed from the secondary to get the proper frequency range. The secondary of this coil has 450 turns. When used with a 460 mmf. condenser, 65 turns must be removed to bring the high frequency end up to 465 kc. Get the RF-IF section working before you attempt to remove any turns. Take the turns off the pi of the secondary nearest the top of the coil. As the wire is *litz* it is necessary to make sure all strands are soldered to get the full efficiency of the coil. The best way to do this is to strip the insulation and clean the enamel with alcohol and very fine sand paper and tin the cleaned wires before soldering to the lug.



R_1, R_{22}, R_{23}—250,000 ohm, ½ watt. Centralab.
R_2, R_6, R_{10}—300 ohm, ½ watt. Centralab.
R_3, R_{28}—10,000 ohm pot. Centralab.
R_4, R_7, R_{11}—60,000 ohm, 1 watt. Centralab.
R_5, R_8, R_{12}, R_{17}—2,000 ohm, ½ watt. Centralab.
R_9—35,000 ohm, ½ watt. Centralab.
R_{13}, R_{14}, R_{30}—500,000 ohm, ½ watt. Centralab.
R_{15}, R_{24}, R_{31}—2 megohm, ½ watt. Centralab.
R_{16}, R_{25}, R_{32}—1 megohm, ½ watt. Centralab.
R_{18}—20,000 ohm, ½ watt. Centralab.
R_{19}, R_{27}—200,000 ohm, ½ watt. Centralab.
R_{20}—2 megohm pot. Yaxley.
R_{21}—50,000 ohm, 1 watt. Centralab.
R_{26}—100,000 ohm, 1 watt. Centralab.
R_{29}—10,000 ohm pot. Yaxley.
R_{29}—75,000 ohm, ½ watt. Centralab.
R_{33}—35 ohm, 10 watt. Ohmite.
C_1—.0014 mf. mica. Sprague.
C_2—.015 m. mica. Sprague.
C_3— .15 mf. paper. Sprague.
C_4, C_{19}, C_{22}, C_{24}, C_{27}—.01 mf. mica. Sprague
C_5, C_6, C_7, C_9, C_{10}, C_{11}, C_{14}, C_{15}, C_{36}—.1 mf. paper. Sprague.
C_8, C_{13}, C_{16}—3 gang, 460 mmf. variable.
C_{12}—built into coil.
C_{17}—.001 mf. mica. Sprague.
C_{18}—250 mmf. mica. Sprague.
C_{20}—.05 mf. paper. Sprague.
C_{21}, C_{23}—.0001 mf. mica. Sprague.
C_{25}—.006 mf. mica. Sprague.
C_{26}—365 mmf. variable.
C_{30}, C_{31}—8 mf. 450 v. electro. Sprague.
L_1—J. W. Miller X-727 (3 needed.)
L_2—J. W. Miller A-727 (3 needed.)
L_3—Standard broadcast coil secondary
L_4—36 turns #24 D.C.C. close wound on ⅞" tube.
L_5—10 turns #24 D.C.C. on ⅞" tube. Spaced twice the diameter of the wire.
(4 needed) Any aluminum shield 2½" diameter 4" long.
Sw_1—Yaxley 31112J.
Sw_2—Yaxley 3226J.
Sw_3—RF-IF switch assembled from:—
1 Centralab K-123 index assembly.
3 Centralab Section G assemblies.
3 Centralab Section H assemblies.
Sw_4—Osc. wave changing switch assembled from:—
1 Centralab K-121 index assembly.
1 Centralab Section G switch section.
1—1852 (R.C.A.)
3—6SK7.
3—6E5.
1—6SQ7.
1—6B5.
1—80.
Speaker—Any standard make 5" dynamic with pentode output transformer.
Chassis—built over an old trf set. If new chassis is used 16" x 8" x 2½" Chassis must be 2¼ high to accommodate Sw_3 and Sw_1.
Power Transformer—standard 5 tube, 6 volt transformer to supply plate current and filament for 5 tubes.
Filament transformer—Filament current for 5 tubes.
Probes—built as shown in diagram. 3 needed. Material, 1 American Radio Hardware Ten Probe, 8 feet Lenz single conductor crystal microphone cable; 2 pcs. metal tube ¼" x 4"; 2 Amphenol miniature plugs No. 70-1M.
Dials—2 needed. Remler dials from old sets are satisfactory.

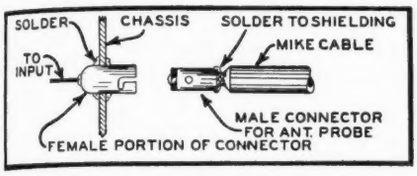
Check with a low range ohm meter to be sure all strands are soldered. The 35,000 ohm resistor across the primary of the second coil reduces the gain to get away from regeneration. Use any value here that will just prevent regeneration when tuned to the highest frequency in the low wave range. It is also good practice to shield plate leads and separate grid leads as much as possible. Shielding grid leads will increase the minimum capacity of


SOLDER TO TUBING
THREE TURNS OF HOOKUP WIRE WRAPPED ON SHIELDING
SOLDER TO SHIELDING
SHIELDED RUBBER COVERED SINGLE CONDUCTOR MIKE CABLE
AMPHENOL 70-1M PLUG. GRIND TO FIT INTO ¼" TUBING

the tuning condenser and will prevent the system from reaching 1500 kc. Don't do it.

After the RF-IF unit is working, complete the wiring of the audio section. Test by picking off an audio signal from a set *known to be good.*

In wiring the oscillator section take care to keep wiring capacity to ground

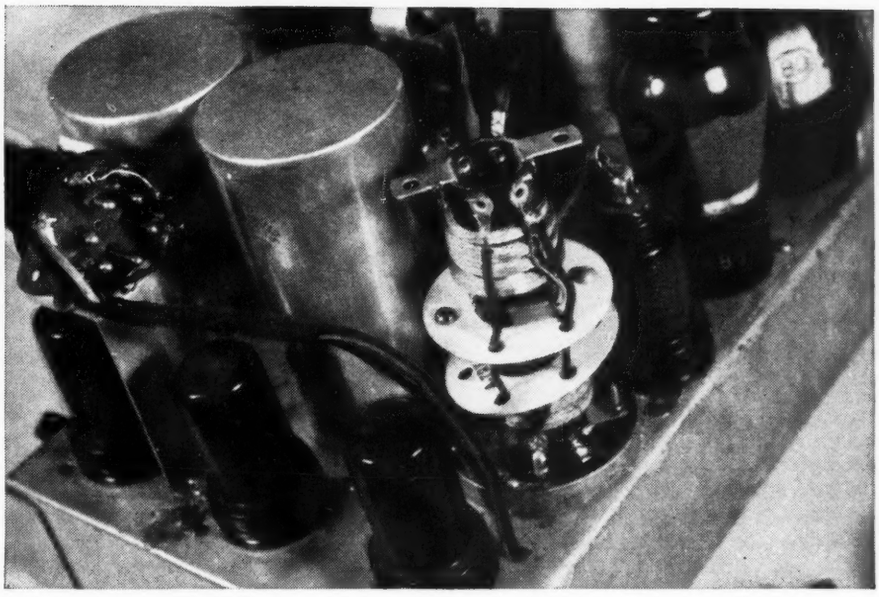


at a minimum and use wire heavy enough that the leads won't shift and change the calibration. The coils for the tuned-plate amplifier are simple single windings. They can be the secondaries of commercial coils or they can be made from the directions in the parts list. Mount them rigidly and keep the leads well separated. In testing, begin by placing the oscillator probe on the plate or grid of the set oscillator. This gives the strongest indication but detunes the set slightly. Placing the probe on the bakelite of the socket or tuning condenser very near the metal part carrying the r.f. current will give a good indication without detuning the set.

The unit still has to be calibrated in the RF-IF and OSC. channels. The celluloid pointers for the dials were made from an old drafting triangle. The index line is scratched on the underside of the pointer before it is mounted. Holes are spaced so as to allow calibration markings for two bands of the RF-IF dial and three bands on the OSC. dial. The ink is removed from the surface of the Remler dials with acetone and the surface slightly dulled by polishing with Dutch Cleanser. Calibration points are located by making pencil dots on the dial through the holes and permanent marks are put in with drafting ink.

The condensers used in this unit are of the gear driven type that require 350 degrees of dial rotation to change from maximum to minimum capacity. The advantage of this is that it spreads calibration markings over 350 degrees instead of 180. Direct drive condensers can be used just as well.

The simplest way of determining

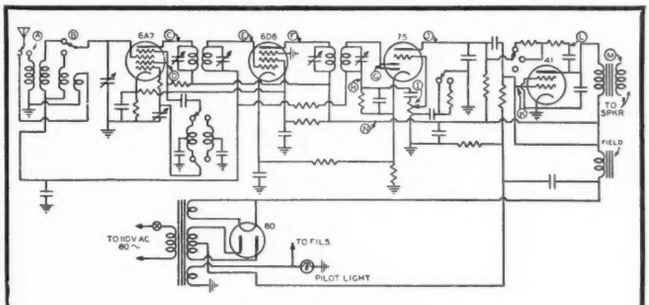


The construction of the RF coil is clearly shown. Note separated leads.

calibration points on the RF-IF unit is to use a good signal generator. Set the generator at exactly 100 kc. (check this by beating the generator against the signal of a broadcast station), and tune in the 100 kc. harmonics on the RF-IF unit. The 50 kc. points can be established by either using the harmonics of a 50 kc. signal (if your generator will go that low) or by placing marks half way between the 100 kc. marks, or by tuning in stations. It is not necessary to calibrate the unit any closer than 50 kc. unless additional calibrations are desired in the region of the popular I-F frequencies. The simplest way to get these points is from an accurate signal generator.

The Osc. unit may be calibrated directly from a generator if it has a very strong output. Another method is to use a good set with a known IF frequency, tune in signals of known frequency and determine the set oscillator frequency by adding the rf and i-f frequencies. The set oscillator will give plenty of output for calibration and you can obtain as many points as needed by tuning the set. There is no advantage in calibrating any closer than 100 kc. on the broadcast band and 500 kc. on the two high frequency bands.

No frequency calibration is needed for the audio channel. It is helpful, but not essential, to determine the



Probe Location

A RF-IF Channel.	F RF-IF Channel.	K Audio Channel.
B RF-IF Channel.	G RF-IF Channel.	L Audio Channel.
C RF-IF Channel.	H Audio Channel.	M Audio Channel.
D Oscillator.	I Audio Channel.	N Audio Channel.
E RF-IF Channel.	J Audio Channel.	O Audio Channel.

Reading

Check signal level at input frequency.
Check signal level at input frequency. Should show increase over level at A.
Check signal level at input frequency. Should be higher than at B. Check signal at i.f. frequency. Check signal at oscillator frequency.
Measure oscillator output during rest of test. Check for continuous oscillator output on all tuning ranges before proceeding with tests.
Check at input grid for i.f. signal.
Check at plate for i.f. signal. Should show substantial gain over signal at mixer plate.
Check for strong i.f. signal.
Check for audio signal.
Check for audio signal listen for quality.
Check audio signal. Will vary with volume control setting.
Check audio signal. Should show gain over signal at H or I.
Check audio signal. Level about the same as at K.
Check audio signal. Should be of good quality and much higher level than at L.
Check audio signal. Level will be lower than at L due to step down ratio of input transformer. If one side of voice coil circuit is not groundred return ground wire to other side to get signal. Put audio probe on B plus line turn gain on full and check hum present in high voltage supply.

amount of input required to close the eye. Determine this by using audio signals from a good set and measure the signal strength needed to close eye (6E5) with a vacuum tube voltmeter across the input to the audio circuit. Determine this for various volume control setting and the multipliers will take care of a wide range of audio signal strength with an accuracy of about twenty-five per cent which is close enough for this type of measurement. It may be necessary to shield the leads of the audio volume control and the grid lead of the 6SQ7.

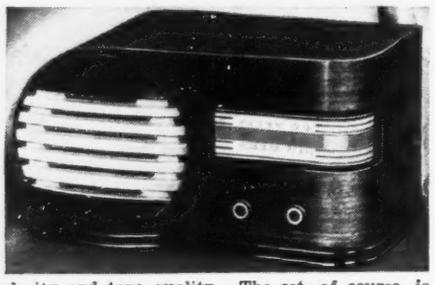
When the signal tracer is finished and calibrated it is a good idea to spend a few minutes practicing on a working set. Using either a signal generator or a strong local station as a signal source, trace the signal clear through the set from antenna post to voice coil. Remember as you move the probe that you are measuring *signal* instead of *voltage* and that the tracer will have to be tuned to the frequency of the signal to get any indication. The test chart shows the tests that can be made and where to apply the probes in a typical receiver. Try the signal tracer on the intermittent set that has been getting your goat. The indicator eyes will watch the signal for you while you work on something else. If the speaker is switched on the RF-IF section you can get a listening tests for intermittents as well. Intermittent sets are perhaps the single greatest obstacle to profitable repair work and signal tracing will locate the point at which the signal changes, faster and more accurately than any other method.

When you have saved yourself hours of time by spotting trouble by tracing the signal you will come to wonder how you ever got along without your signal tracer. —30—

"WAR REPORTER" RADIO RECEIVER ANNOUNCED BY TRAV-LER

The intense interest in European war news has prompted the Trav-Ler Radio & Television Corporation to bring out a brand new Model which it calls its "War Reporter."

This Model is said to be the only a.c.-d.c. set in the market built especially for European short wave broadcasts. It is claimed that with special engineering improvements which it embodies, broadcasts from European capitols can be tuned in with the same ease as dialing local stations, and the broadcasts come through with unusual



clarity and tone quality. The set, of course, is equally efficient for domestic broadcast reception.

A description of the set discloses that, among its many features, it is a 6-tube "superhet," which operates on either a.c. or d.c. electric light current. The Vernier drive illuminated slide rule dial makes station selection quick and easy, and its 4-inch electro-dynamic speaker and automatic volume control assures exceptionally pleasing reception. —30—

☆ ☆ ☆

PRIZE WINNERS OF THE OCTOBER COVER CONTEST

WELL, the Cover Contest is over! Replies from readers from the Philippines to Portugal have been flooding our office. As a great many of the replies and contest entries were extremely clever and well thought out, the job of the Judges was a most difficult one. However, every single entry was carefully classified and discussed and we believe that in picking the winners we have given due regard to everyone's efforts.

Among the unusual things in the entries was that a large number of readers picked the title: "Television? or Tell-a-Vision?" We found several hundred readers had picked as another very popular title, "Illusion and Disillusion." Another was, "Cheers and Jeers." Another was, "What Price Television?" For no apparent reason, these various answers came in in great numbers.

We wish to congratulate the First Prize winner and all the other Prize winners upon their success. To everyone who participated in the Contest, our deepest gratitude for your interest.

The list of Prize Winners is below, and they will have already received their checks by the time that this is in print.

Since this contest has been so popular, we are going to run another one in a couple of months. We would welcome suggestions from our readers as to just exactly what type of picture they would like to have us use for prize contest material.

PRIZE	WINNER	TITLE
1st	R. A. Lynn, 424 Fourth St., Lockport, Ill.	"Televised Touchdown Takes Thrill from Tustle for Tootsie but Tightwad Teems with Team."
2nd	Martin Mullin, 3138 Abell Ave., Baltimore, Md.	". . . or a Reasonably Accurate Facsimile."
3rd	Philip Rosenblatt, 834 Beck St., Bronx, N. Y.	"Cheerman of the Bored."
4th	Jack E. Bannon, 412 Seneca St., Oil City, Pa.	"Receiving the Game While Deceiving the Dame."
5th	Wm. Hakkarinen, Negaunee, Mich.	"On the Spot with a Hot Cathode."
6th	Harry Allwine, Box 513, Boulder City, Nevada.	"Maybe I *shouldn't* have complained so much about the cold weather last time."
7th	Jerry A. Callner, 2703 Ainslie St., Chicago.	"I'd like to see him get a hot dog out of this thing."
8th	Jack Anderegg, Colonia, N. J.	"All dressed up—and no need to go."
8th	Claude J. Schmidle, 2616 Ashurst Road, University Heights, Ohio.	"All dressed up but no need to go."
9th	Philip Rosenblatt, 834 Beck St., Bronx, N. Y.	"Delight that Failed."
10th	Martin Mullin, 3138 Abell Ave., Balti., Md.	"Boy Cheats Girl."
11th	Mrs. E. A. Wright, 1508 Sixteenth Ave., Seattle, Washington.	"He gets the *current* ball game there, (Ignores the currents of frigid air:) She thinks *he's* a *pig's* kin, too *'Grid'—irony* describes her view."
12th	J. R. Ross, 6—4th Ave., West Haven, Conn.	"What OFFENSE . . . a television 'BAWL' game . . . so FUR away!"
13th	Robert DeBerardinis, 2237 S. 24th St., Philadelphia, Pa.	"She's got a sweetheart in every college—Yah! But a television fan at Notre Dame—Darn It!"
14th	W. O. Ritter, 313 Pearl St., Sandusky, O.	"It's the Finish of a 'Big Moment' for this Frathead."
15th	Harry Allwine, Box 513, Boulder City, Nevada.	"I just wonder if he expects to 'attend' the dance by television also."
H.M.	Mrs. W. E. Pickard, Albany, Ga.	"Her four-word 'pass' would be: 'DIALated, PIX-elated, SCOTCH-related, ABUMnus'!"
H.M.	E. E Waldron, 600 Hurlburt St., Peoria, Ill.	"As Notre Dame thunders, another dame wonders."
H.M.	G. E. Fahy, 22 Colonial Pl., New Haven, Conn.	MORAL—Never "Tell a 'vision'" what a 'sight' she's going to see!
H.M.	Robert Rogers, Lachute, Quebec, Canada.	"Tele-foiled."
H.M.	Frank Finver, P. O. Box 56, Brooklyn, N. Y.	A "Broad" cast in a silly setting.
H.M.	Dale Funk, Millersburg, Ohio.	"Tele-gusted."
H.M.	James Ross, 6—4th Ave., West Haven, Conn.	BANNER ATTRACTION . . . . GRIDIRON-Y: ("A cheer . . . A jeer . . . TELEVISION'S . . . HERE!")
H.M.	R. C. Montgomery, 2594 Elizabeth St., Salt Lake City, Utah.	"A let-down, A sit-down, AND A touch-down— Radio Scores!"

(*Concluded on page* 50)

BENCH NOTES

by LEE WARD
Service Manager, San Francisco, California

Awards to the winners of the Repairman's Riddle No. 3, plus some good customer counsel are this month's subjects.

So much contest mail is on my desk this month there's no room for my feet. But the break in schedule has its brighter side. I sincerely enjoy the work we do together—even though our only exchange is through the impersonal medium of Farley's forwarding service.

Now and then comes a bug in the balm. The letter below, for instance, from the former customer of an unnamed repairman:

The other day my X-7 *went dead. I took it to a repair shop and asked what it would cost to fix it. I was told the minimum cost would be $1.50 for aligning, plus the cost of parts if any were needed.*

When I called for the receiver, I was told the charge was $3.35, and that the i-f transformers needed adjusting and that two or three resistors had to be replaced.

The business of radio servicing seems to be pretty much of a racket because of these exorbitant charges. Therefore, to enable laymen like myself to locate and fix common radio receiver troubles which are usually caused by lightning, static, dampness and other weather changes, won't you kindly publish an article telling how to find what is wrong from the r-f stage to and including the speaker, using inexpensive tools?

Yours truly, ————————

So the business is a racket, is it? Lemme at 'im! Hold me back! So help me, I'll ————————!!!!

No, that's not the way to handle it. Let me go—I'll be all right.

Now, then. No matter what we, as servicemen, think of this fellow's opinions, we must respect them. He has written with a serious attempt to solve a problem of personal encounter with a member of our craft. Pardon me while I speak to him.

Sorry, Mr. Dash, there cannot possibly be an article telling you how to service your own radio. There are a hundred or more probable causes of future failure in your one set alone. In remedying any of them, technical training is required. No book, nor set of them, can treat each set fault specifically, even though the reader be a technician.

What you really request is a substitute for schooling ($200); set of circuit diagrams ($75); reference books ($100); tools, meters, workbench ($250); rent and overhead ($?); and thereafter continuous sundries. If I understand your letter correctly, the cause of your complaint is that you paid $1.80 over the quoted minimum, without being told the work was necessary. I suggest you do business with a repairman you can trust with that amount; or, if you can find none, insist that no additional parts be installed before you authorize them. Thanks for writing—you have brought a very important point to our attention.

We servicemen can improve our profession if we do nothing that will drive our trade to repairing their own sets. To prevent misunderstandings, then—*quote before you work!*

This beautiful layout is one of Chicago's most successful service stores.

Customer Counsel

Too often a disgruntled customer pays a repair bill, and—instead of complaining to the repairman—poisons the neighborhood against him with slanderous stories. Whether or not his complaint is justified, gossip does the dealer no good.

Too often a serviceman does not know when he has offended the customer. Sometimes, if the customer hints at dissatisfaction, the serviceman resents the implication he is a "gyp," and writes the customer off as a crank.

Suspicious customers, meeting resentful servicemen! Certainly not a healthful condition in what we all wish to make a fertile field!

I believe, if these conditions can be aired, both sides will surely benefit. The subject is admittedly a touchy one, as shown by the manner which speakers and writers usually shy away from incidents involving ethics; but prudery has not helped us.

Customers and servicemen are invited to send their complaints to Lee Ward's *Customer Counsel,* care RADIO NEWS. Those of general interest will be used as a basis of discussion. No need to pull your punches—if parts of the letter are used, names and identifying places will not be mentioned—unless the sender so requests. Simply tell what your complaint is—what you like least about the necessity of hiring a serviceman, or of being hired by a set owner.

My sole objective is the formulation of a set of working rules—derived from *actual* conditions in the field—which will serve to improve trade relations.

Ward's Awards

Repairman's Riddle No. 3, involving Cliff's perturbing session with a *Philco 20,* elicited some very interesting information. The answers indicated that, while the average serviceman is more than qualified to cope with practical field work, he gets into a tough spot when he attempts to write *an exact technical explanation* of his action.

The offending part was the easily-identified push-pull input transformer.

(*Continued on page* 55)

A blind serviceman who has taught himself how to read a tube tester.

Some think this man is a "Radio Engineer"!

WHAT IS A RADIO ENGINEER ?

"AND what," I asked my nephew Donald, as I patted his little head, "do you wish to be when you grow up?"

"I used to like you," he replied, pulling away from under my hand. "Let's keep it that way!"

He crossed his legs, to bring his first pair of long pants into obvious play. "I want," he said, "to be a radio engineer, like you." Then, after a slow appraisal: *"Better* than you. How does one go about it?"

"Well," I told him, "you can go to school—some technical school."

"What school makes you a radio engineer?"

"Ah, let me see. None, exactly. But you must attend technical—"

"What school did *you* attend?"

I hesitated for a second:—

"There was a bit of trouble with the high school administration when I reached the third year," I was forced to confess, "which expedited my departure. I *really* learned my profession by working in the field."

"Mowing hay?"

"Of course not! I gained experience by getting jobs that were connected with radio."

"Then why should I go to school? I'll just go to work, and *call* myself an engineer."

"Why, you couldn't do that, Donald—it wouldn't be ethical. You must become qualified *before* you start to work as an engineer."

"I don't understand you, Uncle Axel. How will I know when I have become one? Will I feel full in the face?"

"Not exactly. You see—"

"The boy eyed me suspiciously. By what right *do* you call yourself an engineer? I'll bet you don't know what one is! By the way, that doorbell you fixed last week isn't working so well."

Donald's parents walked in just then, and got me out of a tough spot. He was right, though—I had been in the profession all my life, took it for granted my varied occupations had qualified me for an engineering title, and let it go at that. The conversation started me wondering, and I began to search the various branches of radio to learn the requirements which were necessary to justify *radio engineer.*

Mr. Frank H. Vizetelly, speaking through the medium of a dictionary, gave qualifications which were too general to be of much help. He stated that an engineer was "one versed in, or practicing, any branch of engineering. A manager, inventor, or plotter." Aren't we all?

I hunted further for more specific connotation. Mr. R. A. Kay, B.S. and M.A., and an instructor in radio communications, told me:

"A radio engineer should be able to read, interpret, and apply technical data. He should be capable, because of ability, training, and experience, to develop a project *on paper.* No definite amount of education authorizes the 'honors, rights, and privileges' of radio engineering."

His last sentence is significant. If you are entering the profession, you might read it again; it should be very inspiring, especially if you are training during your spare time, or cannot afford a degree.

This ability to handle work in an abstract form falls into line with the opinion of radio amateur Edwin A. Carter, W9RLZ, who recognizes mathematics as the language of engineering:

"The question is interesting because there is some connection between the amateur and professional fields.

"To determine whether or not a radio worker is an engineer, ask him to build some equipment for you. If he uses a soldering iron, he is a 'ham'; if he reaches for a slide rule and retires to the reference room, he's a scientist; both, an engineer."

Laboratory worker Alfred Kahn expressed himself:

"The title 'radio engineer' has often been seriously abused, and has therefore fallen into disrepute among the men most deserving of its use. A radio engineer should be one who, after majoring in radio, obtains a technical degree and who then engages in the profession to earn his livelihood.

"The complexity and extent of radio makes it impossible for any one man to master all its phases. The title should be qualified to restrict its coverage. 'Antenna engineer' is an example. The broad implications of 'radio engineer' should not be used except for the most general group classifications—on an income tax blank, for instance.

"I have met but one person who used the general title officially. He was selling vacuum cleaners."

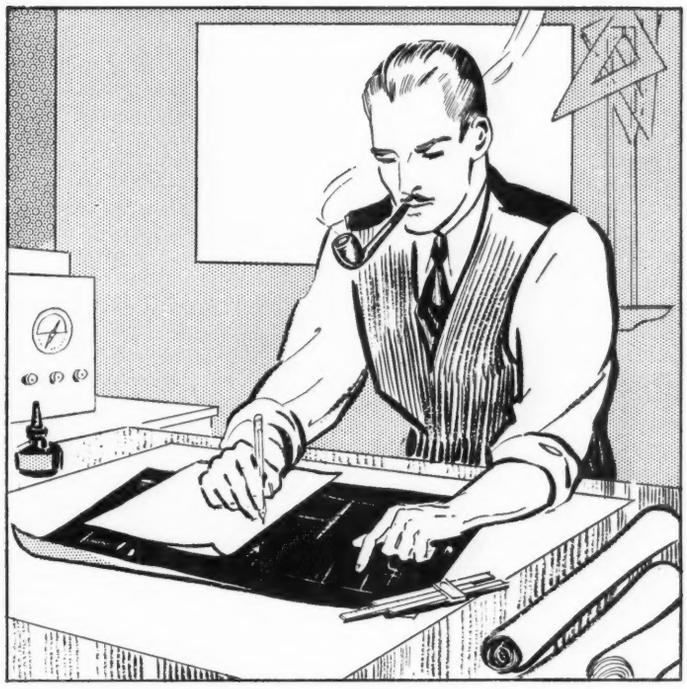
Whether the story told of Dr. Lee de Forest—the *Father of Radio*—is true or not, it illustrates Mr. Kahn's point concerning the wide extent of the profession. When his broadcast receiver stopped one evening the Doctor cast a therapeutic eye on the chassis. Its components had such unfamiliar shapes that he shrugged his shoulders, muttered that it was a wise father who knew his own children, and 'phoned for the local repairman!

The five letters of the word "radio"

The term "Radio Engineer" has come to cover anything from a licensed operator to a serviceman. What are the opinions of the trade, and what should you really have to be titled a "Radio Engineer"?

by

AXEL FREEMAN STRONG
Shelbyville, Illinois



This is the popular conception of a "Radio Engineer."

are strained and stretched in covering the present wide fields. If the growth of the art continues at its present square-law rate, new titles—more specific ones—will soon be necessary.

Stopping in a radio repair store, I asked the owner-serviceman if he was a radio engineer. He replied:

"Often. Any repairman who improves the operation of a receiver by changing it from its original design is an engineer. If the nature of the change involves an original idea, he must arrive at the reasons for the change by an exercise of his technical training, as did the design engineer who laid out the first electrical circuit before production.

"I do not, however, think it would be ethical to use the term as part of my business name; not because it would be untrue, but because it might appear pretentious to my customers."

It is probable that servicemen avoid the qualification "technician" because of its similarity to the ill-sounding "beautician" and "mortician."

Judging from wholesalers' catalogues, which sometimes list items called "service *engineer's* oscillator," "service *engineer's* test prods," and "service *engineer's* wrench," one need only to obtain one of these tools to become qualified. They, in the name of *Recovery,* are willing to concede the title to any person with an order blank.

Some companies call their employees engineers of one type or another, although the employees' initiating requirements do not involve engineering. There is a common understanding among radio men that routine work does not deserve an engineering title, and the intermediate "technician" is coming into use. The employers' only sin, then, would appear to be a love of euphony—which is gladly forgiven if looseness of title helps to avoid such specific horribles as the one in use by a western utilities company: "Insulation, Wear, and Suspension Engineer." A title that precise probably makes its owner wince because it is made so evident to the world he can't juggle.

Many radio workers are better qualified than their work demands; naturally, very few persons are fortunate to exercise all their talent and experience on another man's job—but it should be a designation of duty, not their experience, which determines their titles. If Einstein were a streetcar conductor, he would not be listed on the company payroll as a mathematician.

Mr. Harold J. Holmquest, B.S., B.S.(M.E.), who—since graduation sixteen years ago—has been a lecturer, physicist, and instructor, is now serving as consultant in abstruse technical matters for a large manufacturing company. He is well qualified to be called "engineer" by the strictest of definitions. When asked for his opinion, he commented:

"The title has been worn thin by overuse."

The purpose of the *Institute of Radio Engineers* is to advance radio and its allied arts. It is to radio somewhat as the *American Medical Association* is to medicine, and its membership has been world-wide during the past 26 years.

There are five grades of membership; none has to do with education. Members are graded according to age and by the nature of their professional accomplishments. There is no reason to name the well-known men who have made admirable records in radio without benefit of degree, but it *is* interesting and encouraging for the beginner to know this condition exists.

Mr. Harold P. Westman, Secretary of the Institute, when asked for a statement, said:

"The Institute has faced for many years the problem of defining a radio engineer, and has come to the conclusion there is no specific definition which may fit all situations.

"It is significant to note that the definition changes from year to year as the field progresses."

At first thought it would seem that more exact standards are needed; but it is unreasonable to expect concise definitions in a profession which shifts and expands as rapidly as radio. Within, new fields are continually being added; without, a thousand moving tentacles connect radio with other fields.

The various opinions as to title are reflections from the multiple facets of the profession as it revolves. These changes are fortunate for the beginner, for they afford opportunities not offered by many other professions. The student should be encouraged by the thought that his future acclaim will depend more upon accomplishment than upon scholastic formality.

An eastern engineering school, advertising a one-year course, quotes from an *Engineering Foundation* booklet:

"Although a college or teachers may help you greatly, no school can make of you a successful engineer or a fine man, nor prevent you from becoming one. *That is up to you.*"

-30-

Serviceman's Experiences

by **LEE SHELDON**
Chicago, Illinois

Sometimes there is an advantage in doing a small courtesy job, since the return may exceed what you might have charged.

READING of a repairman who doesn't want business is as unusual as an owl in a life-boat; but I assure you, when I say I'm glad we lost an important repair job last week, it's not because of an over-due dotage.

In the future, when my partner's persecutions finally make my mentality mealy, I promise to close the store quietly and spend the rest of my days peeling Brussels sprouts. Until then, let me tell you what has happened during the past few days. The account leads to a very interesting point, and I hope you grin when I bare it.

The customer's name was Johnson, and—as always when Al is out of the shop—I drew out his conversation as much as possible.

He was a "radio editor," he told me, on the staff of the *Daily Diatribe*. At night, he ran an amateur station. Very interesting; and we had been talking about twenty minutes when Al came in. He smiled as he passed Johnson, frowned as he passed me, and began to hum as he dropped his toolbag in the back room. Judging from the noises I heard, he had gone to work at the test bench; but judging from the noises I *didn't* hear, he was listening to our conversation.

Naturally, I became a bit self-conscious.

"That story about working an Aussie (Australian amateur) must be very interesting," I said, clearing my throat for more formal utterance, "but you said something about repairing one of your oscillators?"

"Oh, yes," Johnson replied, "I've got a trick unit in the basement that needs attention, but I've been too busy to get it running. Think all it needs is a ten thousand ohm *C* taper volume control. Can you put one in for me?"

"Certainly," I said, "tonight be all right?"

"Fine!" he agreed. "Saw off the shaft to three-quarters of an inch before you leave the shop—I have all the other tools you'll need. Of course, you understand I could do the work myself, so I'll pay only for the part. Seventy-three cents, isn't it?"

Before I could answer, Al walked to the front of the store.

"Let me get this thing straight," he demanded. "You want us to work for *nothing?*"

"Not exactly," Johnson said, sort of embarrassed by the abrupt treatment, "you see—"

Al turned to me.

"Quote three dollars and fifty cents," he announced, as if we were alone, "take it or leave it!" Also tell him we are very busy, and that *Salutary Sales & Service* is not *Hobby Lobby!*"

Johnson didn't answer. He waved from the door, smiled, and said: "Thanks, anyway, Lee!" without looking at my partner. Then we *were* alone. Neither spoke for a few minutes, while we sort of squared off for an argument.

"But you said that it was your best baby *radio!"*

"You shouldn't have done that," I told Al. "It would have been good store policy to help that fellow—he's a newspaperman, you know."

"Yeh," Al came back, "one who uses the power of the press to squeeze free work out of honest businessmen. I sure like to batter down his type!"

"He was a 'ham', too," I tried to reason.

"Then you were wasting your time," Al snarled. "Don't you know there are two things a ham never finishes: his transmitter and his conversation? They're no good as customers!"

"Servicemen and amateurs," I placated, "have a common bond in radio, and should act together as brother members of a great fraternity. We all belong to the huge *hertzian* homogamy. There are an equal number of amateurs and repairmen in this country. If each ham bought one tube from each repairman—"

"—they would want them at net prices," Al interrupted. "In a radio store—as in a restaurant—ham and *aches* go together. Keep them out! And forget your happy homogamy unless you want this Jensen a.c. dynamic pulled down over your ears!"

"Listen, Al—" I attempted.

"Listen, nothing!" he shouted. "Professional amateurs take away a lot of our business—you know that as well as I!"

"No they don't," I responded, becoming feverish by induction. "It's the amateur professionals who run down a repairman's reputation. Lots of servicemen have amateur stations—are you condemning the radiomen in your profession because they happen to have a hobby?"

Al hit the side of his head with his hand.

"I," he said despondently, "am a business Achilles. My commercial life will end because I work with a weak heel!"

"You are mistaken," I told him. "If the store closes, it will be because one of your caustic cracks leads to an open break. What's more, I would have done Johnson's work for him if you hadn't spoken out of turn!"

That was Tuesday. Friday afternoon Vincent—manager of *Redoubtable Radio Repairs, Inc.*—dropped in for a ten thousand ohm *C* taper volume control. They are competitors, but we have a sheathed-sword agreement between us if either store runs short of stock.

"Here you are—gimme a chit," Al said. "By the way—want us to cut the shaft down to three-quarters?"

Vin raised his brows in surprise.

"How'd you know?" he asked.

"We threw that dead-beat out of here a few days ago," Al smiled, "and you won't make a dime on the job!"

"Don't expect to," Vin replied, "we're doing the work just for publicity!"

"Gee!" I commented, sensing support.

"Haw!" Al scoffed.

"Great teamwork, boys," Vin laughed, "see you later!"

We both felt too strongly to reopen our argument, but I knew I had scored a point.

(*Continued on page* 58)

Modernizing Old Receivers

by CHARLES R. LEUTZ
Glendale, L. I., N. Y.

A shipboard installation which can be modernized.

PART 1

When you cannot sell that customer a new set, try getting him to let you modernize his old one. Many "lost" sales can be salvaged in that manner.

DURING the severe economic conditions that have prevailed the past ten years, radio receiver manufacturers and dealers have been confronted with unusual problems. In the first place the large group of unemployed individuals must be eliminated as new set prospects except, possibly, for the lowest priced units. True, there is a fair sized group of prospects, uneffected by present conditions, and a large percentage of these people are new set prospects annually. However, out of all new set prospects, a very large percentage are hesitating to buy new receivers now for one of several reasons.

First, they may not feel optimistic about the future or their position and accordingly decide to conserve cash. Others, having invested a substantial sum in their present radio receiver, feel that more value should be obtained from that before making another purchase. Another group, much larger than generally appreciated, resent the present method of combining advertising with entertainment and they do not listen to radio regularly. In this last mentioned group there are hundreds of thousands of well educated people in the upper bracket income class that are ready to buy high grade receivers when at least some of the programs are raised to their level of intelligence.

The prime question that concerns every new set prospect is "If I buy now, will my investment become obsolete within a year or two?" In the light of past experience, the prospect is certainly justified in hesitating, especially where a substantial sum is involved.

In the automobile industry, the sale of properly rebuilt second hand cars is a substantial part of every dealer's business. Automobile executives know that the sale of used cars does not detract from the volume of new car sales, as a matter of fact without an efficient system to dispose of used cars, the sale of new cars would fall off substantially.

In the radio industry the attitude is entirely different, the singular thought on part of the manufacturer, distributor and dealer is new set sales.

Authorized dealers of the various automobile manufacturers are highly organized to give their customers efficient service at reasonable prices, every effort is made to retain the customer's good will. By making sure the owner gets value out of his initial expenditure they know he will be back for a new model in due course. Consequently automobiles are used until they reach a condition where it is no longer economical to make repairs. The properly rebuilt used automobiles are purchased by people unable to afford a new car.

The above policy is followed equally successfully in many other industries,

typewriters and other office appliances are rebuilt several times and used over a period of 20 years or more.

In radio the waste from obsolescence represents a staggering sum annually. Millions of dollars worth of fine cabinets, expensive chassis and good parts each year become junk. Millions of electro-dynamic loud speakers have been discarded simply for the want of a new diaphragm and voice coil. There

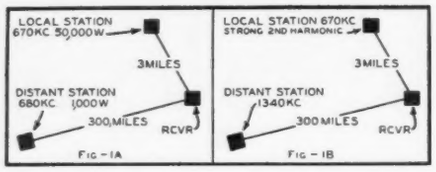


FIG-1A FIG-1B

are hundreds of thousands of sets which have been discarded that could have been rebuilt economically providing good sets at reasonable cost to the group unable to purchase a first class new set.

Over 15 years ago when the writer was manufacturing radio receivers, it was reasoned that any radio receiver originally designed fundamentally correct, need not be subject to rapid obsolesence. A receiver designed on the above basis readily lends itself to alterations to include new improvements as become available. Accordingly each year in announcing new models, we also offered a modernizing plan to the old customers whereby their receiver could be brought up to date at a reasonable sum. The factory's summer modernizing business often reach over 50% of the winter new set volume. The idea created valuable good will, some sets were sent in for modernizing every year, some three or four times over a period of 10 years. Even foreign customers sent their sets here in bond, from various parts of the globe, for modernization.

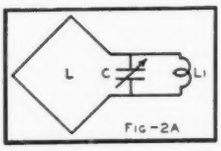


FIG-2A

Recently the writer approached a number of radio set manufacturers on the subject of modernization. The reaction is divided into two widely divided opinions. One group believes that modernization is an obstacle to new set sales. The other group realize that possible modernization, extending

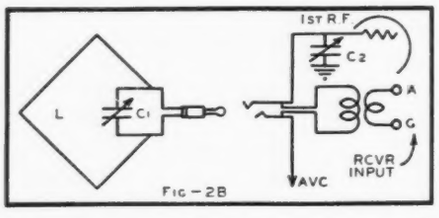


FIG-2B

the prospective life of a receiver, will be a definite means to stimulate immediate new set sales. They know it will help overcome the fear of rapid obsolescence.

Products intended to be manufactured identical, a certain model automobile, typewriter, rifle or a radio receiver, vary substantially in performance. Some customers become attached to an exceptionally good radio receiver; it is difficult to sell them a new instrument but it is not at all difficult to sell them the idea of more improvements for their set.

Dealers, technicians and parts manufacturers have millions of dollars worth of potential modernizing business annually, not only for radio receivers but for public address systems. Each modernizing job means the automatic sale of a new set of tubes and invariably other accessories.

This article is based on the contention that the time has arrived when radio dealers and technicians must realize that new set sales and simple service are only a part of their total potential business. The opportunity is available to start building good will among customers by expanding and extending the value of initial investments in radio receiver purchases—new set sales will then follow more easily and automatically. The customer's fear of rapid obsolescence will gradually disappear.

The possibilities of radio receiver modernization can be outlined as follows:

1. Antenna Systems.

A. Reduction of local interference by the use of special aerials and leadins.

B. Improvement to signal to noise ratio and the elimination of interfer-

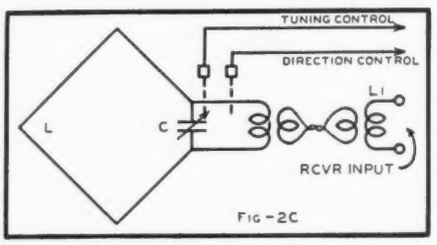


FIG-2C

ing stations by the use of directional aerials or loops.

2. Tuned Radio Frequency Receivers.

A. Addition of improved new type tubes to reduce cross modulation, increase sensitivity and selectivity.

B. Substitution of new improved iron core radio frequency transformers for the new type tubes.

C. Rearrange audio amplifier for improved quality of reproduction.

D. Substitution of new improved loud speakers and possible installation of additional speakers.

3. Super-Heterodyne Receivers.

A. Addition of improved new type tubes with a view to securing a higher order of selectivity, sensitivity and fidelity.

B. Substitution of new modern radio frequency and intermediate radio frequency transformers to supplement the new tube changes.

C. Improvements to the audio and power audio amplifiers.

D. Substitution of new modern high fidelity loud speaker and possible installation of one or more additional loud speakers.

4. Accessories.

A. Installing Filters or Traps to eliminate "Image Interference," Station Interference, 10 kc. Whistles, etc.

B. Possible Installation of a Pre-Selector Tuner.

C. Possible addition of a Ultra High Frequency Converter.

D. Addition of local or remote controlled Push Button Tuning.

E. Installation of single or double cathode ray tuning indicators.

F. Addition of manual or automatic record player.

G. Addition of oscillator and substitution of new pick-up head to old record players.

H. Adding Volume Expanding circuit to old audio amplifiers to provide

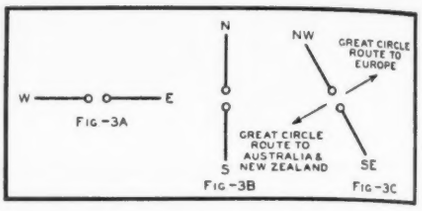


FIG-3A FIG-3B FIG-3C

improved reproduction from records.

I. Addition of Beat Oscillator, Noise Silencer and Signal Calibrator as DX aids.

In the first of a series of articles, the matter of antenna modernization will be covered exclusively. The performance of probably 90% of all radio receivers in use can be improved by the installation of a better aerial system, designed to meet the requirements caused by the different locations involved. For example, simple doublet aerials are very common although they are only efficient signal collectors in two general directions.

A common problem is shown in Fig. 1a where the receiver is located within a few miles of a local high power broadcast station. The customer wants to receive a certain program from a distant station. The local high power station operates on 670 kc. The distant station is several hundred miles away, has relatively low power and operates on an adjacent channel, 680 kc. There are several possible solu-

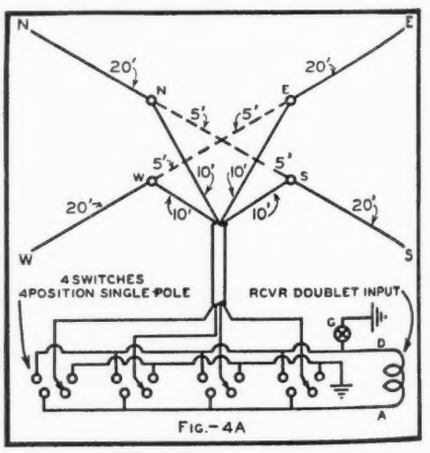
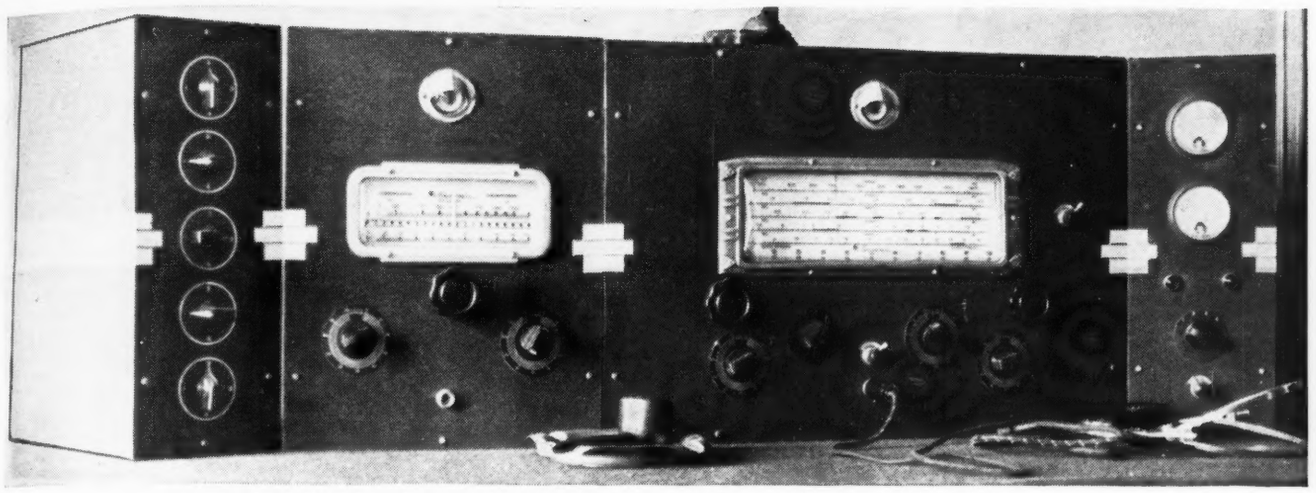


FIG.-4A

tions including a pre-selector or an extremely selective intermediate r.f. amplifier, althorgh the latter excludes the possibility of fair quality of reproduction. However, disregarding the re-



An excellent job of modernizing an old receiver, making it as "new" as 1940!

ceiving apparatus for the moment, if the two stations concerned are at right angles to each other, or approximately so, the strong local signal can be conveniently eliminated in favor of the desired distant signal, through the use of a directional aerial or a loop.

The same problem exists (Fig. 1b) if the desired distant signal operates for example on 1340 kc. and the local 670 kc. transmitter radiates a strong harmonic. In this latter case added selectivity to the receiver cannot possibly solve the problem, but the difference in direction of the two arriving signals can be used to reach a satisfactory solution.

For many years commercial engineers have appreciated the value of confining the transmission of radio signals to the direction or directions desired. There is no sense in radiating power in all possible directions in order to communicate in only one direction. Likewise there is no sense or reason in trying to design a receiver to differentiate between signals and disturbances arriving from all directions when 50 to 75% of the undesired signals and disturbances can definitely be eliminated as a function of the signal energy collector. Why try to eliminate noise within a receiver which should not be allowed to reach the receiver in the first place? Why erect an antenna to simultaneously collect signals from every direction when it is desired to receive from only one direction at a time?

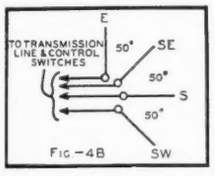


FIG.-4B

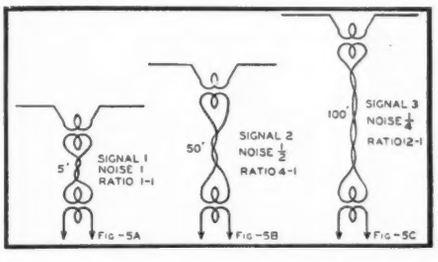
Fig. 1a shows how effective a loop aerial can be in enabling satisfactory reception of a weak distant signal separated only one channel from a strong local signal. Fig. 1b shows the loop solution of the same problem involving two unequal strength signals, both on the same frequency, or one on a strong harmonic.

While loops have been developed to a high order of magnitude for marine and aerial navigation, their use in connection with broadcast reception has been neglected. The use of a good loop automatically eliminates undesired signals and local electrical disturbances from at least 50% of all possible directions. Fig. 2a shows the most common method of loop connections, L being the loop and C the loop tuning condenser. In Fig. 2b the loop is directly connected, by a plug and jack, into the grid circuit of the first r.f. stage of a super-heterodyne or tuned radio frequency receiver. If the loop has the proper inductance value, the loop tuning condenser C is eliminated and can be replaced by a small vernier condenser C-1 connected across the loop or in parallel to the set first tuning condenser C-2.

Fig. 2c illustrates a de luxe loop installation arranged for remote control, viz located on the roof of a house, the top of a high building or on top of a mast aboard ship. Two aerial couplers and a transmission line connect the loop to the receiver input. The loop change of direction and adjustment of the loop tuning condenser is taken care of by remote control motors continuously variable in either direction, or variable in steps by a multiple electromagnetic switch. The low voltage miniature a.c. motors formerly used for remote controlled tuners are ideal for the above system. Where close discrimination between different directions is required, part of the loop may be shielded, leaving an unshielded portion just large enough for efficient pick-up.

Most receiving locations are subject to excessive electrical disturbances, for example on board boats or yachts, in large apartment houses or in congested residential sections. Electrical disturbances should be eliminated at their source when possible, by the application of filters to elevator motors, refrigerators, oil burners and other electrical appliances, or devices. Complete elimination at the sources is not always possible or practical and some interference may remain. In the latter case, the actual signal collector elements of the aerial should be removed far as possible from the source of disturbances. For example in an apartment house the live portion of the aerial should be elevated on the roof; out in the suburbs at a location subject to excessive automobile ignition interference, the live portion of the aerial can be moved back from the road, several hundred feet if necessary. In the above examples a transposed lead-in is used, so that the signal and interference pick-up is confined to the elevated aerial collector elements only.

A good many all wave receivers are used with a doublet antenna. Invariably the doublet is supported between the most convenient points available and with little regard for the directions involved. A simple doublet is directional broadside, that is if the doublet runs West to East (Fig. 3a) maximum reception is obtained from North and South, minimum reception from the West and East. In this country, the above doublet, generally speaking, would be unsatisfactory for good European short wave reception; that is also true of a North-South Direction, Fig. 3b. For the eastern part of the United States, best European reception is obtained with the doublet direction Northwest and Southeast, in which case it is most effective over the great circle route



from Europe and of course also in the opposite direction from Australia and New Zealand. Therefore, if maximum results are required from all possible directions, more than one doublet is necessary.

Fig. 4a shows two "V" doublets erected at right angles to each other. The four elevated elements are brought to a control switching panel through a four wire transposed transmission line. Accordingly the arrangement not only provides the two prin-

(*Continued on page* 54)

READERS' WRATH

HITTING THE "SIGNAL TRACING"—"CATCH AS CATCH CAN" FEUD

Dear Sir:

I have just hastily gone over your rebuttal to Johnny Rider, regarding super test instruments, and as usual heartily agree with many of your points. I have made myself fairly unpopular among many of our local "radioneers" by shouting loudly that no amount of instruments would take the place of the old noodle, when delving into the mystic radio.

I have always hooted loudly at the so-called portable "laboratories," which combined all services in one case, and required a 100-page instruction book before using. Some time ago I stated . . . that a good man with a volt-ohmmeter could in most cases find the trouble while the man with the "laboratory" was finding the right page in his instruction book.

Another point you bring out well is the lack of interest customers have in your test equipment. This "impress your customers" stuff has been fostered by the guy with instruments to sell, and a lot of goofs have swallowed it. In the past ten years I have not found one customer in a thousand that voluntarily expressed any opinion regarding test equipment. As a test I have at times called the customer's attention to a new instrument only to get a blank stare and a grunt. Most customers know that a certain amount of test equipment is needed, but as far as their interest is concerned it is practically nil. In the 20's when many sets where home-made the customer did love to see a lot of mysterious meters, and so on. I remember the shop test panel we had at that time, which held every meter in the place, with a multitude of jacks, knobs and so on. It is true that some of the meters were not even wired in, but they looked good.

I also note the amount of equipment taken on call. It has long been my contention that the experienced man carries a minimum of equipment in the customer's home. Personally, I take a tube tester, pocket volt-ohmmeter, and what small tools may be required to take a chassis out of the cabinet.. I believe it is good policy to test the tubes in the presence of the customer before the set is taken away. The reasons for this are more or less obvious, to the experienced man.

Note also your crack about the oscilloscope. I had one for a short time, but decided it was a damn nuisance in the repair business, and sold it when I had a chance. The enthusiasts I know that have them, become more or less spluttery when pressed to tell just what they use it for. It is my impression that most owners go out of their way to use this instrument in servicing. It is certainly ridiculous to mention using an oscilloscope to line up I.F.'s on a $19.95 midget! One fellow even insisted they were fine to locate hum in AC-DC midgets! A .5 mf. condenser will do this just as well, at a cost of 28c. . . .

(Sgd.) R. K. Wheeler,
2308 Park Ave.,
Indianapolis, Ind.

Dear Sir:

I have been in the Radio Service business over 16 years and for the first time I have had the unquenchable desire to write a long and heated letter, expressing my opinions, to a technical publication of any kind. However, when two fellows like John F. Rider and "Tester" Bradley get together in the same issue and try to cram such widely divergent views on the same subject, both of which are wrong, down the throats of poor, puzzled, hard working and generally underpaid radio service men, it is high time someone straightened the whole gol-durned mess out once and for all time.

"Can you send over the same serviceman, please?"

In the first place, I am inclined to agree more with John than with "Tester" Bradley, especially about the elimination of guesswork by using the Signal Tracing method. However, John, I certainly would not lug a Chanalyst or anything nearly as big and heavy as it is into a customer's home. It just isn't good business and besides, as Tester says, it usually makes a customer suspicious.

In the shop, however, Ah Ha! that's a different story. Put on the dog on the workbench if it will speed up your work, and I sincerely believe in plenty of **good** instruments, chosen for ease of manipulation, flexibility and accuracy. "They will pay you a good profit if you know how to use them and **how to handle the customer after you** have used them.

For instance, this has occurred many times in the professional life of every service man.

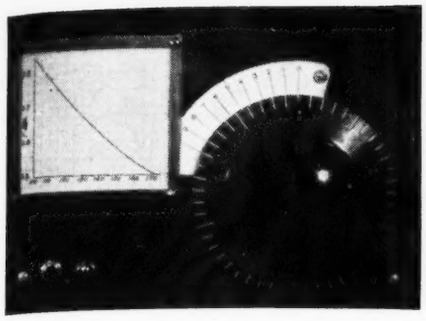
Telephone rings— "Hello, how much do you charge to come out and look at my Radio? It sounds awful." You get the name and address and promise to be right out, that is if you're not already up to your neck in work. If you are, skip the rest of this tirade and get to work where you belong. Of course, if the lady insists on a telephone estimate, why the only thing to do is to explain that it is impossible in the present state of the art and persuade her to let you come out anyway and see what the trouble is. Upon entering the home and turning on the offending machine, you find that it sounds like the tin can telephone you used to play with as a kid and since it is a fairly modern radio, you immediately begin to suspect various and sundry parts that have given the same symptoms in other machines of similar build. You see? guesswork before you even started to test it and it didn't take any time either. Check audio coupling condenser with volt-ohmmeter a-la Bradley and find trouble. **But** from there on out, Tester, you missed.

Trying to make money off leaky coupling condensers is a very precarious and trying job. So what? "Well, Mrs. Jones, we can patch this set up for about so much, but just replacing the burned out part will only let your set play about as good as it did just before it went completely bad on you. Now, let me take it to the shop and put it in as good or better shape than it was when it was new and then I can really do a first class, guaranteed job on it."

When that set gets in the shop, then is the time to give it the works with the high-powered instruments and find a flock of bad tubes, misalignment, dirt, poor resistors, dried out electrolytic condensers and anything else that may be faulty. Then the customer can be called by telephone and the various items carefully explained to them, together with the total cost of a guaranteed job and then let the customer decide how much of this he can afford, but guarantee only a **complete** job. I have yet to see a radio which I was called to service, "Tester" **right** in the customer's home in a half hour or so. And besides, there is no profit in that kind of a job. If the customer wants radio right now, let him have a loaner, it pays every time.

The secret of success in my humble opinion, is not only in knowing your stuff with instruments, but in knowing how to handle all kinds of people. Folks are far more complicated, now-a-days, than radios, and stalling for a little time to use the heavy apparatus on a radio in the shop, where it belongs is an art

(*Continued on page* 58)



A laboratory vernier is extremely useful in calibrating wave-meters, and other experimenter's precision apparatus.

Constructing a LABORATORY VERNIER

by **EUGENE NORWOOD**
E. Stroudsburg, Pa.

For exact measurements, some form of precision vernier dial will be required. Try this one.

IT is a well known fact that the eye is capable of much greater accuracy in determining when two lines coincide than it is in estimating the distance between two lines. For this reason, a vernier is used on various scales and dials to read accurately an otherwise estimated value.

The writer recently constructed a simple e.c.o. frequency meter which, while it possesses inherent limitations of accuracy, requires a dial reading accurate to one-tenth of the smallest division in order to achieve the maximum permissible accuracy. The dial and drive unit used in the frequency meter is the National type PW, which is widely known. The manufacturers, in producing a dial of this type, made the *least* division of far greater width than is generally found in other dials. This permits greater ease in *estimating* readings to four digits.

However, even in such an excellent instrument it is possible to obtain assured accuracy only to the third digit when consideration is given to the erratic error introduced by the human element in estimating a fourth-digit reading. As it was desired to have readings of assured accuracy to the fourth place, the need for a vernier was created.

There are two types of vernier which lend themselves well to this class of work: the *direct* and the *retrograde*. The reading of the direct vernier is added to the main-dial reading, and is read in that direction, i.e.—"ahead" on the dial. The retrograde vernier reading is also added to the main-dial reading, but the vernier reading is, as the name implies, made by going "backwards" on the main dial. Since this characteristic is likely to cause some confusion in determining which main-dial reading is to carry the vernier reading, the direct-vernier was given preference.

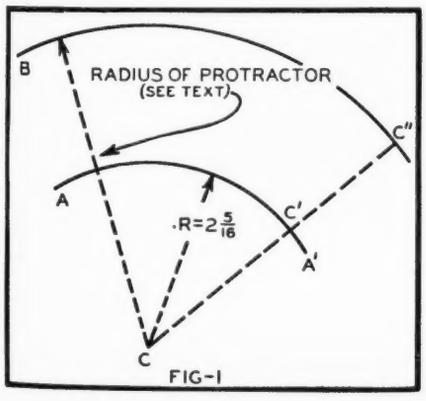


FIG-1

The fundamental requirement of the vernier is, in this case, that it shall read 0.1 of one main-dial division. From the principle of this type of vernier, its total length, v, is equal to the total length of (n—1) main-dial divisions, where n is the number of divisions in the vernier. In other words, if the vernier is to read 0.1 of the smallest main-dial division, it will have 10 divisions whose total length is equal to 9 of the smallest main-dial divisions.

It is readily apparent from inspection of the dial that there are 360°/50, or 7.2° per-dial-division since there are five main divisions each having ten subdivisions. As our vernier is to have 10 divisions whose total length equals that of 9 main-dial divisions the length of one vernier division is 0.1 x 7.2° x 9, or 6.48°.

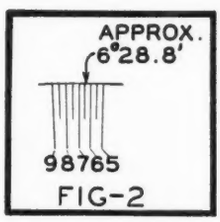


FIG-2

The remainder of the problem is to transfer this information to a suitable piece of paper or metal. The writer chose paper, it being the easiest with which to work—and because no suitable metal-working facilities for this type of work were available.

Three simple drafting instruments are the only tools required. They are: a straight-edge (worthy of the name) a protractor and compass (or dividers). If available, the large compass should be supplanted by the more accurate spring-bow compass, or dividers when the drawing is ready for the division of the vernier.

In order to minimize errors in the vernier, care should be taken in the steps of its construction and in the use of the instruments employed. The protractor should be one of reasonably large radius, preferably not less than 4". If you are in a town, or nearby one in which there is an engineering college or office, you may be able to borrow a protractor of the precision type. This instrument permits adjustment to the exact angle required here. If you do manage to borrow such an instrument, have the lender instruct you in its use and adjustment. However, with reasonable care and use of common sense, the ordinary type of protractor will serve just as well.

The paper on which the vernier is drawn should be heavy white drawing paper of high quality, and large enough to accommodate the particular protractor you use.

As the radius of the PW dial is 2 5/16", the first step is to draw an arc of this radius to an extent of some 65 or 70 degrees. At one end of the arc, create a starting or reference point simply by making a pencil mark on the curve. In passing it is suggested that a hard (4H) pencil, sharpened to a needle-point, should be used.

With the straight-edge as a guide, draw a light line from the radius point of the arc through the reference point previously made thereon. Extend this line so that it ends slightly beyond the radius of the protractor, or, if a precision protractor is used, beyond the length of its arm. Slight pressure should be exerted in drawing the lines, as it may be necessary to erase them in event of a mistake.

Draw another arc, having the same center, or radius point as the first, and of a radius which is equal to that of your protractor. If the protractor is of the precision type, draw the arc with a radius about ½-inch shorter than the arm of the instrument.

Construction is now at the point

(*Build further on page* 57)

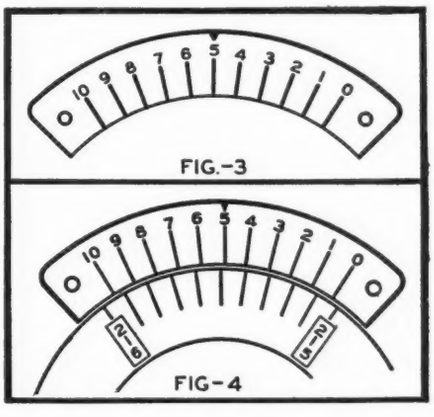
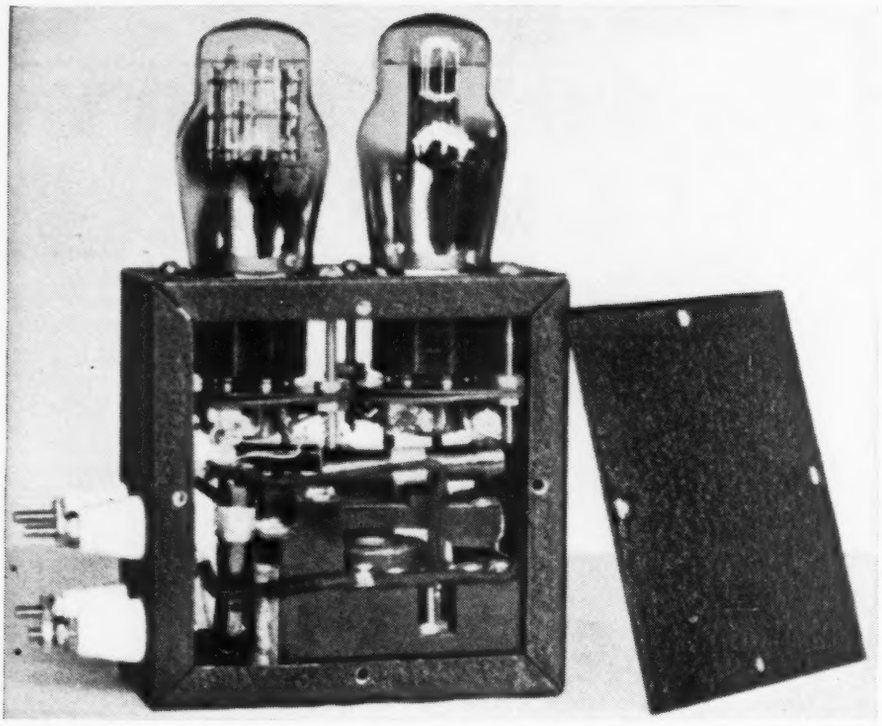


FIG-3

FIG-4



The completed unit is compact, sure-acting and fool-proof.

Electronic Time-Delay Relay

by

LEWIS VAN ARSDALE, Jr., W8QZR

Cleveland, Ohio

Using the heaters of 2 25Z5's as the heart of an inexpensively built time-delay relay.

THE author has been searching for quite some while for a gadget that would automatically apply the plate voltage to the mercury vapor rectifiers in a transmitter at a given interval following the turning on of the filaments (from ¾ to one minute) thus preventing any possibility of a flashover damaging the tubes. True—there are several manufacturers that make various types of time delay relays, but their cost was always considered somewhat high for the convenience they afforded. After trying many schemes, the one to be described fills the bill as economically and thoroughly as anything we have seen, and its action is positive and completely automatic.

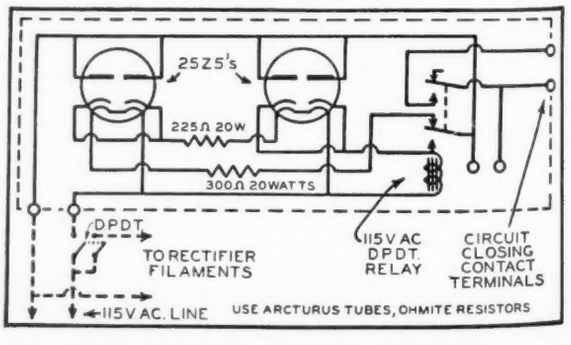
The schematic diagram is almost self-explanatory regarding the function of this unit. When the D.P.S.T. switch controlling the transmitter is closed, the 115 volt a.c. circuit is completed on the heater of the first 25Z5 tube and the tube starts to heat. When the cathode of this tube reaches sufficient temperature to begin rectifying, the heater of the second 25Z5 begins to heat in view of the fact that the heater of this tube is connected directly across the d.c. output of the first tube. When the second 25Z5 tube starts rectifying, the pulsating d.c. output of this tube flows through the winding of the relay causing it to close. The second the arm of the relay to which the a.c. line is connected touches the lower contact, the relay is held closed by the line voltage, and at the same time, the a.c. is removed from the heater of the first 25Z5 permitting both tubes to cool.

The relay is held closed as long as there is no interruption in the 115 volt circuit, but if the line current is interrupted even momentarily, the relay will not close until the relay tubes go through their heating cycle again. This is one feature not possessed by some of the commercially available time-delay relays—that is—regardless of how momentary the interruption of the line voltage, there is no danger that the plate voltage will be placed on the rectifier tubes before the usual time period has elapsed. This factor is especially important for the fellow running his rectifiers pretty close "to the line" as it only takes one surge to take them to the "Rectifier Happy Hunting Grounds" under these conditions, but even for the tubes that are being run lightly, this system has its advantages as it will assure maximum tube life.

The relay used in this particular set-up is a regular 115 volt a.c. relay of the double pole double throw variety. Several different makes of relays have been tried in this circuit, and all of them worked nicely. There may be a little chatter as the relay closes, but this is not objectionable as it clicks into place as soon as the a.c. circuit is completed through the closed contacts. In this connection, if the relay does not close properly but seems to hesitate and merely buzz, the difficulty is usually insufficient voltage on the heater of the second 25Z5, and the trouble may be readily corrected by reducing the value of the resistor in series with this heater. The values shown, however, were found satisfactory for the majority of 25Z5 tubes tried.

For actual use, this circuit was built in a small metal cabinet as shown in the accompanying photograph. By doing this, it is possible to use this assembly as a circuit component in any power supply rather than having to take the trouble of finding places to mount the two tubes and relay separately. Two of the four ceramic feed-through insulators carry the 115 volt a.c. leads to the relay assembly, while the other two are connected to the circuit closing points as indicated on the diagram. The tube sockets are suspended down inside the small cabinet to keep the overall height of the unit within reasonable limits.

It will be noted that, should a longer delay be desirable, additional 25Z5 tubes may be readily added. However, two tubes were found to produce a sufficient delay when used in connection with rectifier tubes in a transmitter as described. The actual delay time on this particular unit is 76 seconds starting from cold. —30—



TECHNICAL BOOK & BULLETIN REVIEW

TECHNIQUES OF RECORDING, written by F. H. Goldsmith and V. G. Geisel, and published by Gamble Hinged Music Co., Chicago, is off the press. This booklet is printed on heavy paper, contains 43 pages of material covering the subject of recording. Many illustrations are included to give the reader an accurate picture for the estimation of correct cutting and adjusting of the cutting head. Chapters included are: Introductory, Harnessing Sound Energy, Amplifiers, Recording Heads, Recording Styli, Turntables, Needles, Materials, Microphotographs, Duplicates, Dubbing, Processed Records, Fidelity, Off-the-Air-Recordings, Studio Recording, Making Good Records, and Applications for Recorders. This book is intended as a handbook on Recording rather than as a technical text book to cover the many phases of the art, and is therefore most suited to the beginner. Price in U.S.A., $1.25.

The new sixth edition of the RADIO HANDBOOK bears similarity to previous editions only in name and in the wide scope of material that is covered. The 1940 edition is not just the previous edition brought up to date; it is an enlarged and almost completely rewritten reference manual on theory; construction, and operation of high-frequency and ultra-high-frequency radio equipment. Each chapter has been entirely re-outlined, new equipment shown, and most of the text rewritten. Two new chapters have been added, introduction to Amateur Radio, and Transmitter Construction. The chapter order has been changed to give a more satisfactory progression from fundamental theory through the more advanced material. Certain chapter divisions made in previous editions have been combined when it was felt that the subjects covered were closely enough allied to warrant inclusion into one chapter.

Radio amateurs, servicemen, engineers, and experimenters will find a wealth of valuable material, both new and fundamental, covered in the book. The chapters on construction are alone well worth the price of the book; the apparatus described employs the very latest in improvement, new ideas, and new components. Almost all the constructional material appears for the first time in this edition. The new equipment shown has been tested and proven under actual operating conditions.

The theoretical treatment of transmitter and receiver theory, modulation, and antenna systems has been enlarged and made more comprehensive. The more useful formulas have been supplemented in a great many cases by charts and tables which reduce calculations to a minimum or eliminate them entirely. —30—

"WERE we mortified, or were we?" should be the title of the picture as we were gently but firmly asked by *ARTA sec. Local 7* to stay outside while their *secret* meeting was in progress. And we remember the day, not so far in the dim past, when not only our presence but also our advice was requested! Such is the price of progress. Information that was formerly distributed easily, freely, an open book to the world at large, a glass house with no fear of any one throwing rocks, today is distributed by a big-business organization with far-flung offices, interlocking teletype systems, furrowed brows and heavy miens.

However, we were somewhat mollified when a chap who had been standing nearby came up and asked us whether we were the *GY* who had been knocking out this colyum for the past seven years. Cautiously we admitted it. But we had nothing to fear. He was a friend who likes our gab and, believe it or not, wants more of it in each issue. All of which kinda softened the blow of the hard-boiled sec.

THERE seems to be great controversy in the ranks of the *V.W.O.A.* organization. The question is not "to be or not to be" but "whether RADIO NEWS should carry the *V.W.O.A.'s* official news?" Brother G. B. Angle (FZ), who is basking in the warm sunshine at *WAX*, Hialeah, Florida, sez. . . . I have been reading RADIO NEWS for years and have enjoyed *QRD de GY* since the days we were all guessing as to who you were. Wylie Paul of our Staff has been a subscriber for some time past. . . . Which makes this a lead-off play for the New Year. So you old timers, *VWOA* men, let's put this thru together, for RADIO NEWS, the one and only section devoted to the welfare of radio operators. Shoot your officials the word and we'll cooperate.

WELL, seein' as how this is the time of year when predicting the future is the national pastime, we don't want to miss this opportunity to do some tall predictin' on our own hook. After all, it only takes wrinkling the brow, sticking thumbs into the armpits of the sleeveless vest and gazing off into space in imitation of a crystal-gazer. Now that our stance is perfect we'll begin: Brother members of the ancient and moldy order of glass wrists, it becomes our painful duty to advise you of the pitfalls that lay in your paths during the year 1940. As we look back into the past, which should be our guiding star for the future, we see that license examinations are becoming more and more difficult. Does it not follow that radiops needs must know more and more about the science of their profession, the innermost secrets of their equipment? New methods and new ideas are continually being perfected in this radio art of ours; therefore must you study to take advantage of these new perfections, otherwise will you be left by the wayside, your more alert brethren taking the lead. Better 'phone equipment is being perfected and installed. Can you take your place besides progress? The New Year will bring many greater achievements for the Safety of Life at Sea and it is your duty to stay with the tide and to grow with it. . . .

IN the person of Gen.Sec. Kleinklaus, the *CTU-Mardiv* sends enthusiastic 73 to all, and brings to our attention their recent signing up of the Boston Trawler fleet consisting of 55 trawlers. There was a bit of discussion as to who was the voice for the radiops in this fleet. The vote of the men left no doubt in the minds of many. They also report that in 1937 there were 3 General Committee members (Executive Board). In 1938 they had 4 members and for '39-40 there will be five members . . . as the membership increases so does the Executive Board increase so as to give the greatest spread of representation for members. The recent election results are as follows: General Chairman, Karl Baarslag; Gen. Sec. Treas., L. J. Kleinklaus; General Committee, Charles A. Luck, Andrew MacDonald, Andrew B. Anderson, Fred M. Howe and Fred L. Ulrich.

AH, the strange ways of mice, men and laws. . . . There is a court battle raging over *ARTA Local 2*, Fred M. Howe, versus M. Rathborne, Pyle and the *ACA*. It has also stuck its difficult questions right into the *NLRB*. . . . It seems that when Fred M. Howe was ousted from the *ARTA/ACA*, he stopped payment of funds from the bank. The court now has possession of these funds and, although it is a question of determining who has the right to the money, *ARTA Local 2*, or *ACA, Marine Division Local 2*, it is in reality a question of who is the duly elected officer of *Local 2*. If the court rules that Howe is the claimant to the money on behalf of the members who voted for him for Secretary, that means that he be returned to office in *ARTA*. At the *NLRB* the question has arisen as to whether *ACA, Marine Division*, or *ARTA, Local 2*, is the correct name of the organization. And some wise guy cracked years ago, "What's in a name?"

AT long last radiops are to be included in the disbursement of Social Security insurance if and when they are on the beach out of work. Effective January 1, 1940, a percentage of the monthly salary will be deducted in accordance with the law. All ships' radiops are required to secure their Social Security account number which will be entered on the ship's articles when they sign on, along with the numbers of their other certificates. What has brought the attention of the powers that be to the neglected radioman is any one's guess, but it is about time that they were included in the government's beneficence.

CONDITIONS with respect to the shipment of radiops to jobs continues mixed due to the neutrality legislation which has kept the movement of jobs at a low figure. In a few instances men have been released from good berths through the change of registry of American ships. But beach lists in both unions are moderately small.

THE *FCC* has released an explanation that they patrol the wavelengths by 26 strate-

(*Concluded on page* 59)

What's NEW in Radio

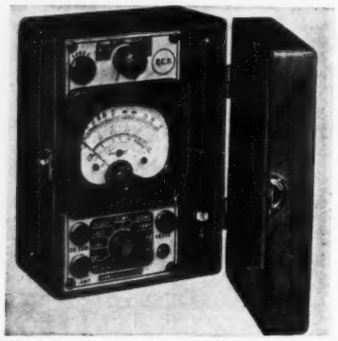
Peter L. Jensen, long known to the radio industry for his work in the development of the loudspeaker, has joined the Utah Radio Products Co. as vice president. He and Pridham developed the first speakers back in 1914. In 1917 he headed the Magnavox Co., later forming a company to be known under the Jensen tradename. His wide experience in the speaker field will aid the Utah Radio Products Co. in setting a pace in the design of new speakers.

A new series of connectors designed to radiate heat away from the grid and plate connections of transmitting tubes has recently been announced by *Bud Radio, Inc.*, 5205 Cedar Ave., Cleveland, Ohio. These tube connectors have a distinct advantage over the usual type of wire and cap connectors as they readily radiate all heat present

at the tube connections due to internal heating and contact resistance heating. This feature protects the glass seals of the tube, eliminating the possibility of tube failure due to this cause. Connectors come in four sizes to accommodate both large and small wire leads and large and small cap leads.

Meters capable of providing a total of over twenty measurement ranges of AC and DC volts, milliamperes, microamperes, resistance and decibels are usually of a size that makes them impractical for inclusion in a compact service kit. However, with the introduction of the Model 413 by *Radio City Products Company*, 88 Park Place, New York City, this is no longer the case. Not only does it provide twenty-three ranges, but offers sensitivity of 2,500-ohms-per-volt for voltage measurements and a low D.C. current range of 0-400 microamperes. Yet it is only 6 inches long, 3½ inches wide and 2⅝ inches deep and weighs only 25 ounces.

The ranges provided are: DC Volts, 0-10/50/-250/1000/5000; AC Volts, 0-10/50/250/1000/-5000; DC Microamperes, 0-400; DC Milliamperes, 0-10/100/1000; DC Amperes, 0-10; Ohms 0-500/-



100,000/1,000,000; Decibels, five ranges from -10 to 69. Except for the 10-ampere and 5000 volt ranges, all ranges are selected by means of a rotary switch.

The meter employed is a 3 inch square, Bakelite encased unit with D'Arsonval 400 microampere movement employing an Alnico magnet. The multiple scale takes care of all ranges and includes a special scale for low resistance measurements in which each of the first 10 divisions represents only 0.1 ohm.

The case is of natural finished wood. Also available in portable hinged cover case.

There are numerous low-voltage radio and electrical applications, including "A" eliminators, rectifiers, and dynamic speaker installations, which require extremely high capacity for maximum operating effectiveness. For such services *Cornell-Dubilier* offers the Type FA capacitor in a variety of capacity values up to 2000 mfd.

Through extensive research it has been possible to supply these high capacities in extremely compact form with the result that the FA-1220

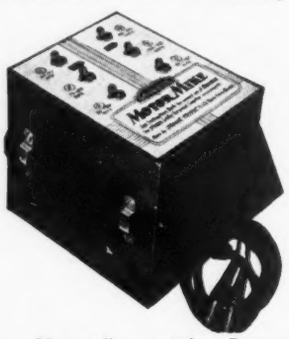
unit, for instance, which provides 2000 mfd. at 12 volts, is only 1⅜" in diameter by 4⅛" in length. Other units vary in size from 1⅜"x 2½" to 2½"x4⅛".

These units are made up in cylindrical aluminum cans with Bakelite terminal caps into which screw terminals are moulded. Over this assembly is a cardboard insulating sleeve. Through a process of double ageing and rigid chemical control unusually stable characteristics and uniform performance are obtained.

Standard FA units are made for working voltages of 12, 15, 18, 25 and 35 volts, and in capacities of 500, 1000 and 2000 mfd.

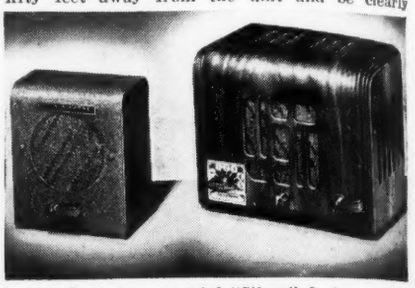
In addition to incorporating many unique features as a motor starting capacitor indicator, Motormike, just announced by *Sprague Products Company, North Adams, Mass.*, serves as an emergency condenser for 110 V. 60 cycle motors where capacities from 54 mfd. to 180 mfd. are required. Motormike tells promptly and accurately what capacity should be used as a replacement on refrigerators, etc. Then, if the proper replacement is not immediately available, Motormike can be left in the circuit as long as necessary.

Motormike is contained in a rugged steel case, 7½"x6½"x6", equipped with a carrying handle. Differing from many indicators which consist of nothing more than a bank of ordinary tapped



capacitors, Motormike contains Sprague extra heavy-duty sections. These will take plenty of overload and can be used for continuous motor starting service if desired. Fustats give double protection. These are readily accessible through a metal flap in the front, which also contains space for extra fustats. This safety feature is particularly valuable in case an attempt is made to start a motor with a frozen bearing, or one connected to a defective compressor.

Talk-A-Phone Mfg. Co., of Chicago, announces a new moderately priced Intercommunication System. Known as the LP-5, this system is of the master selective type. It works with up to a total of five sub-stations. The Master Station can call any one of the individual sub-stations or all together at one time. Sub-stations can call the master at will. Sub-stations can communicate with the Master Station without operating switch—and persons may speak as far as fifty feet away from the unit and be clearly

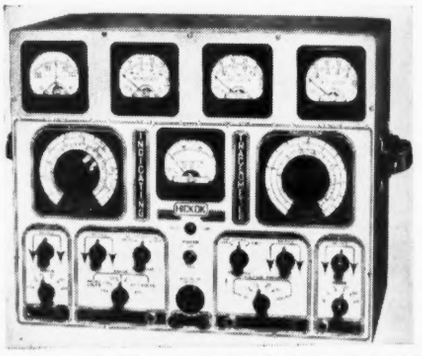


heard. Includes a special "Silent" feature which permits master to be called, yet excludes noise pickup from sub-stations. Operates from 110 volts AC or DC.

This instrument with its five meters permits dynamic signal tracing at its best—measuring and tracing the signal (without interfering with the performance of the set) in any five circuits at the same time. *Hickok model 155 Traceometer.*

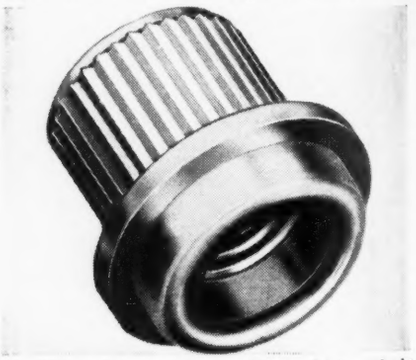
These are the five measurements that can be made simultaneously without disturbing the natural set operation: Measurement of the signal in microvolts at any point in the RF-IF section; Measurement of actual oscillator voltage throughout its entire range; Measurement of all DC Voltages, A.V.C., A.F.C., Power Supply, etc.; Measurement of any A.F. or A.C. voltage in any circuit; Measurement of actual wattage consumption of any A.C. system to 300 watts.

Special features include: Ample ranges in all



sections of this outstanding instrument for all measurements desired. The vacuum tube Voltmeter circuits are so arranged that accidental overload cannot possibly damage meters. A 5 amp. fuse on the front panel protects entire equipment including wattmeter. Pilot lamp on front panel gives continuous indication when instrument is in use. Instrument has self-contained voltage regulation for the vacuum tube voltmeter circuits operating the indicating meters.

Elastic Stop Nut Corporation, 1015 Newark Avenue, Elizabeth, New Jersey, announces an expansion of its line through the introduction



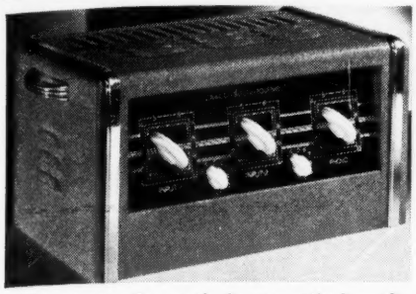
of nine new types of nuts all of which embody the basic Elastic Stop self-locking element, a resilient non-metallic collar which is built into the head of the nut.

This collar, in resisting the entrance of the bolt or screw, forces the thread faces into a pressure-contact which is maintained after the nut is tightened. With thread play thus eliminated, the nut cannot work loose under vibration,

operating stresses, or wear of surrounding parts.

The new types of nuts are designated as thin hexagonal, spline, internal wrenching, countersunk and counterbored one-lug anchor, countersunk and counterbored two-lug anchor, countersunk corner anchor, bracket anchor, floating right-angle anchor, and floating basket anchor. With variations in sizes, thread systems and materials, 160 new standard items are offered.

Erwood Sound Equipment Company, 224 W. Huron St., Chicago, has just announced a new amplifier having a power output of 28 watts. It is said that this amplifier has unusual overload capacity and the distortion at the rated output is less than 5 per cent. Provision has been made for two microphones and a phonograph input. Two frequency characteristic controls, a high and low, are provided to adapt



reproduction to the particular acoustical conditions encountered. All controls are mounted on an edge illuminated dial of plastic material.

Output impedance is variable by means of a tapped switch located on the rear of the amplifier. Provision has also been made for use of a remote control to adjust the volume from some remote position.

The amplifier is housed in an attractive steel case of modern design and is finished in a beautiful maroon wrinkle with chrome trimming. Ample ventilation is provided and tubes are readily accessible through a hinged door.

Majestic Radio & Television Corporation greets the new year with an entirely different, new, portable radio.

This new receiver introduces a completely portable, A.D.-D.C. and battery, radio operated by push button control and with a battery regenerator to prolong battery life.

It is compact, measuring only 12″ in width and weighing only 12 pounds complete with battery.

A self adjusting handle permits carrying as a small brief case. A slide panel protects the face of the receiver when radio is not in use. When in use, the protective panel lifts and "disappears" in the top of the case, revealing a large slide rule dial, in an embossed and hand tooled dial panel, two knobs for manual control, and three push buttons.

The push buttons turn off reception, operate on battery, or operate on A.C. or D.C. current. A distinctive feature of battery regeneration is used by pushing in all three buttons when the

receiver is connected with an electric line or by having the battery button pressed in when the radio is operating on line power.

The Majestic Model 5BD is a 5-Tube improved superheterodyne including three double purpose tubes which give reception comparable with 8-Tube performance. It has a single wave band for standard American broadcasts, a dynamic speaker and automatic volume control.

The cabinet is finished in either Steerhide or Rawhide, assuring lasting beauty.

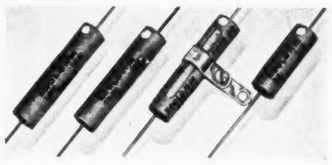
The newly announced *Howard* Progressive Series of communication receivers is now in production for the amateur. Designed for maximum economy, these units will find wide acceptance. Frequency Monitor, and external speaker. This entire layout may be started with an investment of $30.00 in a receiver. Later the receiver may be converted to a seven, nine or ten tube set. This enables the purchaser to obtain a better receiver when he is able to do so, and without any loss from trade-ins.

Now available generally for the first time, *Sprague Koolohm Resistors*, made by the makers of famous Sprague Condensers, represent a unique departure in the construction of wire wound units.

Every fractional inch of wire used in their windings is uniformly insulated with a hard, moisture-proof insulation developed especially for this purpose. It conducts heat away from the wire with amazing rapidity and is not damaged even by bright red heat.

This insulation of the wire makes possible interleaved windings wherein wires touch, but do not short. This feature in turn permits the use of larger, stronger wire to give higher resistances in smaller size.

Interleaved windings also permit a guaranteed accuracy of 5% or better and, along with other



exclusive Sprague features, pave the way for non-inductive Koolohms with 0 inductance at 50 mc, and distributed capacity of only 2 mfd., at the lowest prices on the market today.

Another outstanding feature is the fact that each Koolohm has an automatic Teledot Wattage Indicator. No instruments are necessary to tell whether or not these resistors are being operated at rated wattages. Tests show that Koolohms take overloads better than any other units but, for double safety, the red Teledot on the end of each resistor automatically changes color and warns when a 25% overload occurs. When the overload is removed, the Teledot returns to its original red color.

Prong-Base midget can electrolytics are announced by *Aerovox Corporation*, New Bedford, Mass. Compact, economical, simply mounted, these dry electrolytics are rapidly growing in popularity for compact assemblies and replacements.

Mounting prongs slip into an elliptic fibre supporting washer (insulated can) or metal washer (grounded can) riveted or eyeletted on

chassis, and bent over. Terminal lugs slip through hole in washer, for soldered connections.

Despite small size, these units incorporate standard Aerovox dry eletrolytic sections. No attempt has been made at ultra-etching or other means of reducing bulk and cost at possible expense of performance and life. Hermetically sealed. Safety vent. Negative can. Single and multiple-section units.

The Transformer Corporation of America, through the *Clarion Institute of Sound Engineers*, announces the new *CLARION* Model C-410 popular-size Permanent Sound System with the positive assurance that it is unsurpassed for design and value. Modern in appearance, up-to-the-minute in design with fine oversize parts and construction, it represents outstanding value

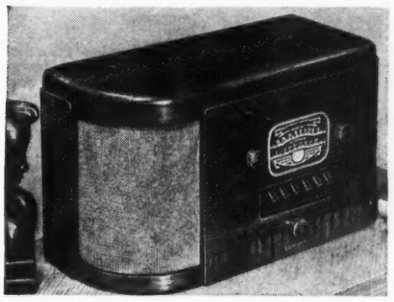
in the sound field.

Precision engineering assures the ample power output of 10-15 watts from the amplifier. Push-pull 6V6G Beam-Power output tubes are employed, as well as a 6J7, 6SC7 and a 5Y4G rectifier. The overall gain for mike input is 110 db.; for phono input 80 db. Hum level below 10 watts is 47 db. Built-in speaker matching transformer is tapped at 8 and 16 ohms. Frequency response is from 40-9,500 cps. A full range tone control is included, so that microphone feedback may be minimized. Operation is from 110 volts, 50-60 cycles a.c.

Two-channel inputs are provided for microphone and phonograph. The single amplifier volume control allows complete mixing and fading facilities, as well as regulation of the microphone input. This feature simplifies operation, and eliminates the need for a skilled operator or sound man.

Especially appropriate for the den or recreation room is the *Lafayette Model BB-27*, one of the latest offerings of *Radio Wire Television Inc.* (formerly Wholesale Radio Service Co.), 100 Sixth Avenue, New York City. Such appropriateness is indicated by the sturdy, frillless cabinet of modernized mission design, 14½ x 6¾ x 8½ inches in size.

No antenna is required for operating in the



broadcast band, but terminals for an external antenna are provided for use when tuning its short-wave band of 4.6 to 12.2 mc. Six buttons provide for instant selection of any one of six stations. These are set in a few minutes, and the setting can be changed at will. Other stations, including the short waves, are tuned in by means of a conventional knob and slide-rule type calibrated dial with inset tuning "eye." Tone control is continuously variable and the built-in speaker is carefully matched. The circuit is a superheterodyne of high sensitivity, the audio portion of which may be used for phono or television sound reproduction by means of terminals and switch provided at the rear. Operating power is drawn from either a.c. or d.c. lines.

The complement of 6 tubes includes: 12SA7, 12SK7, 12SQ7, 35L6GT, 35Z5GT rectifier and a 6AB5 tuning "eye."

The new *Weston tube checker*, Model 777, includes potentials for all tubes up to and including the 117-volt types. In addition, this checker is equipped for opening the filament circuit and making tests on all ballast tubes including those with ballast resistor connections across the normal filament pins. These tests are also carried out with the electrode switches.

Loktal tubes of all types may be tested, as well as each of the other bases. A spare socket is provided for possible future requirements by

wiring two combinations, 4-5-6 prong types in parallel, so that the first socket can be removed and a spare socket of some new design can be included.

The Model 777 tester is available both in counter and portable types. On the counter type, quick location of test data on any particular tube is made possible by a new roller index system which provides a much greater number of tubes included on the roller chart. This chart indexes directly with an etched bezel. The noise test and complete inter-electrode short check have been included in this model. Since the requirements are entirely different for tubes and batteries, separate arcs are provided on the scale—one for battery test measurements, one for tube test measurements.

For further information concerning the Model 777 Tube and Battery Tester, address the Weston Electrical Instrument Corporation, Newark, N. J.

Operadio Model 414. This Portable Public Address Unit, designed to use the Remote Controler feature, leaves little to be desired in a Unit of its size and type. It is so flexible, compact and durable . . . so highly efficient and economical . . . and produces amplification so nearly perfect, that the user's satisfaction will know no bounds says the manufacturer.

The Model 414 is housed in a single three-piece carrying case. The upper halves each house a heavy duty 12" Operadio permanent magnet dynamic speaker and 25 feet of rubber covered cable. For transportation, these halves fasten together and are hooked to the bottom of the case which acts as the amplifier base. The microphone is also carried in this case.

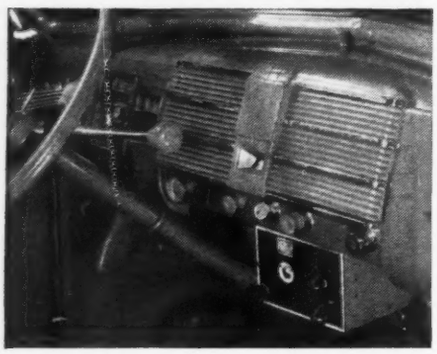
The controls on the amplifier are set in an illuminated recess on the face of the amplifier,

which protects the controls against damage, and accidental turning while the amplifier is in operation.

While the Operadio Model 7685 Crystal Microphone Assembly is furnished with this Unit, a velocity, dynamic, or any other high impedance microphone may be used. The amplifier electrically mixes any two of the above microphones or two microphones with a high impedance phonograph.

The case is finished in handsome two-tone gray leatherette, to match the amplifier which is finished in durable gray baked wrinkle.

E. I. Guthman & Co., Chicago, announces a new converter. This mobile or permanent converter operates with any 6 volt car radio or 110 volt a.c. home receiver, taking its power from such receiver through three easy connec-



tions. Has switch to select either 5 or 10 meter bands, and to choose between converter and regular set. Special condensers and rigid construction to assure steady signal over road jar. Particularly adapted to amateur work on U.H.F. mobile contacts, and to police two-way control.

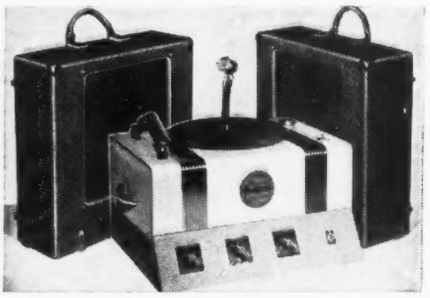
The Kenyon Transformer Co., Inc., of 840 Barry St., New York, N. Y., has just announced a new series of three transformers known as CATH-O-DRIVE units which are designed to Cathode Modulate various types of transmitters. Specifications are as follows:

TYPE	D.C. Max. Sec.	Audio Tubes	Case Size
T-471	200 M.A.	Single 6F6	2 A
T-472	300 M.A.	PP 6V6's or 2A3's	3 A
T-473	450 M.A.	PP 6L6's—AB_1 or AB_2	4 A

Complete data showing the many combinations possible with various tube impedances will be mailed upon request.

Heading the new Audiograph Sound Systems, just announced by *John Meck Industries*, located at Randolph and Elizabeth Sts., Chicago, Ill., is the Model AMR-25C, which provides twenty-five watts output for operation from either six volt battery or 110 volt power line.

Some of the features of this unit are an optional phono player top with crystal pick-up and constant speed motor, new inclined control panel,



economy switch that saves over half of the battery current between announcements. Licensed under ERPI patents.

Complete descriptive literature is available on this, as well as the other Audiograph models, by writing the manufacturer, mentioning this publication.

Three new tube types recently introduced by the *Arcturus Radio Tube Company, Newark, N. J.*, are finding widespread favor among leading set manufacturers and will be found in many popular models to be featured during the forthcoming season.

TYPE 3A8GT Diode-Triode Pentode Detector Amplifier (filament type) is designed for use in

receivers operating from a low voltage battery filament supply. It consists of a pentode section and a diode-triode section with a common filament in one envelope. The pentode section can be used as a high-frequency amplifier, and the diode-triode section as a combined diode detector and resistance-coupled audio-frequency amplifier. Filaments may be operated in series at 2.8 volts or in parallel of 1.4 volts. In parallel, the filaments may be operated directly from a 1.5 volt and in series from a 3 volt dry battery.

TYPE 117Z6GT is a midget high vacuum Full-Wave Rectifier of the heater type and is designed for operation directly across a 117 volt line. By bringing the center tap of the heaters out to No. 1 pin, it is possible to operate the heaters in parallel on 58.5 volts with a heater current of 150 milliamperes. This tube utilizes a 7-pin Octal base.

TYPE 117L7GT midget Rectifier-Beam Power Amplifier has been designed primarily for output-half wave rectifier service in a.c.-d.c. battery receiver combinations as a source of filament current and plate supply for lighting line operation. Heater voltage is 117 volts; heater current .090 ampere. Plate and screen voltages in the amplifier section are 90 volts; plate current 45 ma.; power output 1 watt. A.C. plate voltage of the rectifier section is 117 volts and the d.c. output current 70 ma.

Complete engineering data on all three types is available and will gladly be supplied free of charge upon request to the manufacturer.

The THORDARSON Electric Manufacturing Company, Chicago, announces the appointment of Edward J. Rehfeldt to the post of Director of Foreign Sales. In addition to this new assignment, he will continue to supervise the Company's advertising.

Mr. Rehfeldt has been associated with THORDARSON for the past six years, during which time he has become recognized as one of the industry's more progressive marketing executives. He is well known to the trade, for he has spent much of his time in the field assisting THORDARSON jobbers and dealers with their merchandising problems.

Ward Leonard Electric Co. is pleased to announce the appointment of R. O. Lund, 1720 North Damen Avenue, Chicago, Illinois, as their representative for the sale of Ward Leonard radio products.

Mr. Lund's territory will be the states of Indiana, Wisconsin, Illinois (north of Decatur) and Kentucky (north of Lexington and Louisville).

A pocket-size battery tester will soon be available to meet the need for a compact, inexpensive unit for correct testing under load of batteries for portable radio receivers. Made by *Weston Electrical Instrument Corporation, Newark, N. J.*, the new unit will be of particular interest to radio servicemen whose tube checkers do not contain provision for this important new test requirement. The Weston battery tester will provide positive data about new batteries as well as batteries in service without the need for duplication of any existing test equipment.

In the same manner as the new Weston Tube and Battery Tester (Model 777), the pocket-size unit has been designed to fulfill the fundamental

requirements for correct radio battery testing, i.e., that when the battery shows "good" on the instrument scale, it will be capable of delivering sufficient potential to the receiver when loaded with all of the tubes to provide good reception. In accordance with data from battery manufacturers, the condition of the battery under test is indicated on a "REPLACE-GOOD" scale with the "cut-off" point set at the proper value. Most important, however, the current drain on the battery is also adjusted to conform to the requirements of the set.

In order to facilitate new battery sales and replacements, the scale consists simply of a REPLACE-GOOD" indication, uncomplicated by voltage indications which might be confusing to the layman. Pin jacks are provided for the different battery voltages encountered—1.5, 6, 45 and 90 volts.

Erwood Sound Equipment Company, 224 W. Huron St., Chicago, Ill., has just announced a new combination 6-Volt D.C.—115-Volt A.C. public address system. The power output of 20 watts is obtained at a distortion of less than 5 per cent total harmonic content.

When used on 115-Volt line, the circuit is of conventional design. An ingenious plug arrangement permits operation on a 6-Volt storage bat-

tery, and a heavy duty vibrator changes the D.C. current to A.C.

Provision is made for either microphone or phonograph record reproduction. The output is variable for a variety of speaker loads.

The entire amplifier assembly is mounted in an attractive portable carrying case covered with attractive tweed material. Case size is 16"x16" x12".

Universal Microphone Company, Inglewood, California, is now manufacturing and distributing its Unicord Recording machine in a new model with portable carrying case. The equipment is a complete professional machine in miniature size with recording at 78 R.P.M. which makes it possible to record a seven-minute pro-

gram on a twelve-inch blank disc. The manufacturers claim for the new Unicord that it reproduces piano and other difficult music with perfect fidelity as well as speech and the usual music selections.

The 100 per cent synchronous motor is a feature of the assembly. Monitoring is through the use of earphones. A new development for this type of machine is that the weight in the center automatically lifts the cutting head out of the acetate at the completion of the recording process.

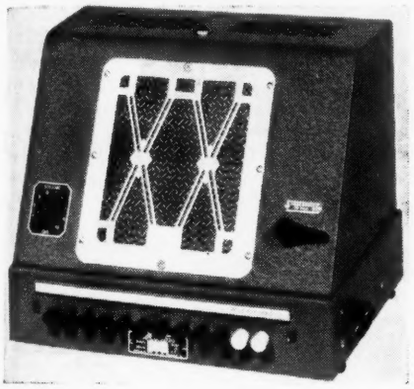
The carrying case is artistically finished with chrome fittings and covered with black leatherette. The top is of a loose-type with hinge pins and can be carried several feet away from the recorder if necessary. The lid houses the holder for the microphone when not in use, as well as the loud speaker unit. Twelve feet of cord comes as standard equipment, while there is an option of crystal, dynamic or velocity microphone.

The Universal Unicord is not a "home recorder," though it does not require technical engineers for its operation. It is adaptable for use in radio stations, advertising agencies, music studios, language instruction, speech teaching, auditions and practice work, personal recording and a multitude of uses in business establishments. The same instrument also comes in a standard console model.

The Intercommu-Paging System, Operadio's latest development in inter-organization communication, combining paging and inter-communication in one System, over one set of wires, gives the user speed, efficiency, and dependability in communciation. Calls go out over the System direct to the person called—and he answers from any place within the area in which the Outlying Station is located. He need not go to the Outlying Station to answer the call.

Outlying Stations Unlimited. Regardless of how large or small an establishment may be, there is an Intercommu-Paging System that will fit. The standard Master Station with ten push-button switches, one for each Outlying Station in the System may, by additional banks of switches, provide Paging and Return Speech for an unlimited number of stations.

Push Button Switch for Each Outlying Station. A positive action push-button switch is provided for each Outlying Station in the System. No longer is it necessary to send a paging call throughout the entire plant. By the use of the push-button switch, the call goes direct to the desired department. Only in the event that the



whereabouts of some particular person is unknown is it necessary to send the call to all of the Stations, and for that purpose we provide—

A Master Paging Switch located in a convenient position on the side of the Master Station. This switch throws all the Outlying Stations into service and the call goes out to each simultaneously.

Volume Control on Master Station. Naturally if the person called goes to the Outlying Station to answer his call, or if the Outlying Station is located in an office or small room, the paging volume must be reduced and for this purpose a Volume Control knob is provided on the face of the Master Station. This knob also acts as an "on-off" switch.

The Use of Several Master Stations Possible. The Operadio Intercommu-Paging System is not limited to just one Master Station, but several may be used. If two are used, they may be connected to each other for complete intercommunication; for example, a Master Station in the office of an executive of a concern and one in the office of the superintendent or manager would be complete communication with each other and would also be connected to each Outlying Station in the System.

If more than two Master Stations are used, they can not be connected to each other but can be connected to all of the Outlying Stations, or as many as may be desired.

Durable, Compact and Powerful. The Master Station is designed and built to the high Operadio standard of perfection. It is durable, compact and powerful. It is finished in gray baked wrinkle trimmed in brushed aluminum. A pilot light indicates that the System is in service. The Master Station has a rated output of 8 watts and a maximum output of 15 watts.

The Intercommu-Paging System operates on 115 volts, 50-60 cycles a.c. only.

The American Phenolic Corpn., Chicago, has introduced a new socket, designed to fit the new all-glass tubes announced by RCA at the Rochester I. R. E. meeting. Socket is of molded high-dielectric black bakelite with seven contacts arranged in a ⅜" diameter circle. Mounts in a plain ⅝" diameter clearance hole, and is held in place with a spring steel retainer ring. Floating contacts won't break seal between glass and .040" tube prongs. Center sleeve shields contacts from each other, and has a hole in lower end for grounding. Overall diameter of socket is no greater than that of the tube.

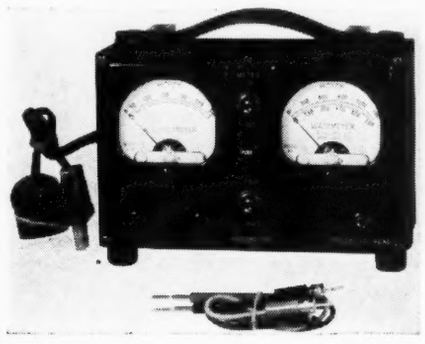
Adapters for these tubes for use with tube testers and analyzers are also available.

Triumph Manufacturing Company, 4017-19 West Lake Street, Chicago, Illinois, present a new signal generator, Model 130. Directly calibrated full vision dial. Only two calibrated scales for all six bands. Ten to one velvet vernier spinner drive. 100 k.c. to 96 m.c. factory calibrated to better than ½ of one percent. Four hundred cycle modulation. Can be varied from 0-75% and may be modulated externally. Ladder attenuation. R.F. output from 0—approximately ¼ volt. Special shielding, removable output plug and single ended tube in keeping with modern engineering. The overall size of the unit is 13" x 9" x 7". Weight: 16 lbs.

This Hickok Model 145 instrument checks line voltage while measuring consumption in watts in refrigerators, washing machines, motors, flat irons, etc. Voltage drop through house wires checked by noting drop in voltmeter reading when appliance is plugged in. Checks starting coils in fractional horse power single phase motors.

Watts are indicated on two ranges—0-750 and 0-1500. The wattmeter has electrodynamometer movement and a uniform scale—*an exclusive Hickok feature.* Voltmeter has range of 0-300 with red line at 110 and 220 volts. Magnetic vane movement gives easy to read, practically uniform scale. Both meters have scale length of 2½".

Two sets of leads are supplied—one set of appliance connecting cables and one pair of three foot leads with test prods to connect to voltmeter



jacks for point to point circuit continuity testing. Toggle switch connects voltmeter direct to separate jacks. Fuse protects all volt circuits.

Meters may be continuously connected to circuit under test.

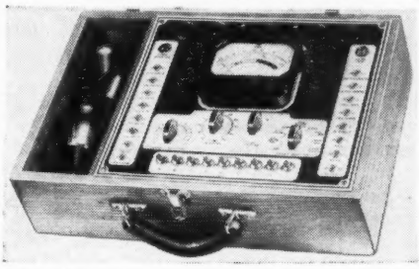
Tester is Hickok quality throughout and is constructed for roughest usage. Steel case eliminates possibility of error caused by using tester too near heavy current carrying mains. Special carrying case has lead compartments. For further information write the maker, The Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland, Ohio.

Standard Transformer Corporation, 1500 North Halsted Street, Chicago, present a complete line of "Poly-pedance" transformers to the trade. These are now available from stock in a cleverly designed, well engineered, attractively priced line of matching transformers. The line consists of two 15 Watt and two 30 Watt driver transformers, two line-to-grid driver transformers and six modulation transformers ranging from 15 to 600 Watts. All units are tapped to give a wide range of impedances necessary for all the present and many future tubes. Catalog No. 160 describes these units and may be had by writing the Standard Transformer Corp. at the above address.

A portable test instrument, having 24 ranges, including fundamental facilities for receiver servicing as well as a practically "obsolescence-proof" tube checker, has just been introduced by Weston Electrical Instrument Corporation, Newark, N. J.

In addition to a flexible tube checking system permitting filament tests up to 120 volts, the instrument provides voltage measurements in 5 ranges (7.5; 50; 150; 500; 1,000 volts a.c. and d.c.); output measurements in 6 ranges (1.5; 7.5; 50; 150; 500; 1,000 volts a.c.); current measurements, d.c. (1; 10; 100 milliamperes); and resistance measurements in 4 ranges (0-10,000; 0-100,000; 0-1 meg.; 0-10 meg.). Voltage, current and resistance measurements are instantly available through pinjacks.

The "Checkmaster" (Model 774) has been specifically designed to meet the need for a single, easily portable instrument for servicing and trouble-shooting in the home, along with wide usefulness in the shop. In addition to its use for tube replacement and home servicing, it makes possible the tests required for preliminary



cost estimates of shop work required, detecting faulty condensers, resistors and the like. Although compact and convenient in shape for easy portability, external styling of the unit is such as to give an appearance of permanence when used on the shop counter.

A group of nine individual electrode switches on the operating panel provides a highly flexible means of testing ballast tubes. Three main controls are employed for selecting correct measurements on any tube type—since the switch must be indexed for proper test, it is impossible to forget the battery or diode switches and leave them in the wrong position.

OZ3, OZ4 and other gas rectifier type tubes used in automobile receivers are tested on a 300-volt potential under load as required for correct operation with vibrators in automobile receivers. This method meets manufacturers' specifications, in that it makes possible an indication of the starting as well as of the operating current.

The Weston "Checkmaster" tests Loktal, single-ended, gas filled, ballast and normal diode and battery tubes. Individual portions of all tubes may be checked while hot, no matter how complicated they may be, including individual diode readings and separate portions of double tubes. A spare socket is provided for possible future requirements.

A self-contained transformer supplies all necessary potential from a 105 to 130-volt a.c. line. The line voltage adjustment on the center panel permits a convenient check on line voltage at any time. As a result, accurate control of line voltage is possible while tube tests are being made without interruption of the test procedure. The new "Checkmaster" is equipped for use with Weston Model 666-1B socket selectors or test leads. Noise, short and leakage tests are also included.

The frequency response characteristics of audio amplifiers and the effects of various amplifier circuit adjustments may now be more easily and conveniently observed through the use of an automatic curve tracer developed by the Photophone Service Division of the RCA Manufacturing Company, Inc. When used in conjunction with an audio oscillator or other signal generating device, this instrument traces the response

curve of the amplifier under test on the "long persistent" screen of an RCA 910 Cathode Ray tube. The intensity and duration of the visible trace are sufficient to permit several curves to be superimposed on the screen for comparison or photographing.

The instrument is completely a.c. operated, portable, and self-contained. It is particularly useful in making production and service tests on audio frequency amplifiers.

Thordarson Electric Manufacturing Com-

(*Continued on page* 61)

Ringing the Bell

Continuing the instruction in simple double entry bookkeeping.

by SAMUEL C. MILBOURNE
Expert Serviceman, Greenwood, Miss.

LAST month we studied the very fundamentals of bookkeeping, using "T" accounts for our explanations of each entry. We found that *bookkeeping is the history of our business* and decided to do the job right by getting a good grade of books and consulting our *local accountant* to help set them up and get us over the "rough" places.

We found that:

A "debit" is a charge against a person or an account, and

A "credit" is an entry in favor of a person or an account.

We found further that every "debit" entry must have a corresponding "credit" entry or entries and that the dollar total of the debit entries should always equal the dollar total of the credit entries.

Now, let us go on from there.

Although your local accountant will set up your books and get you started, you should have some idea as to what books you will use and what accounts you will find necessary. *Never use more accounts than absolutely necessary.* They merely confuse you and add unnecessary labor.

In my business (I do both radio service and sales) I use printed invoices, a *Journal* and a *Ledger.* Thus, only two books take care of my bookkeeping needs.

My *Journal* is a *"Universal" Multi-Column Book — Number S81-326CJ, made by Wilson-Jones Company.*

My *Ledger* is a loose-leaf *Peerless Endlock Sectional Post Bdr. Style 4, number 7253, also made by Wilson-Jones Company.*

My invoices are pre-numbered in duplicate, the original going to the customer and copy being filed in a binder *(Style SL Slotted Lock Binder No. 269—Wilson-Jones Company).*

You will find that these books will suit your purpose nicely unless you do a large volume of business.

Let me explain at this point the difference between a *Journal* and a *Ledger.* Your *Journal* is a record of your business *chronologically,* that is, *according to time.* Your *ledger* is a record of your business *according to accounts.* Remember, you need *both* records, you use *both* records, and you keep *both* records. Your original entries are in your *journal* from which they are "posted" every day, every week or every month to the proper *ledger account.*

While it is not absolutely necessary, it is helpful to segregate your *sales* (both set and repair sales) from your other transactions, so you should establish your "Sales Journal" about half-way back in the journal book.

John Doe Radio Sales & Service
March 1, 1940
Assets & Liabilities

Cash on hand	$154.25	
Bank Balance	249.27	
Accounts Receivable—Repairs	64.25	
Accounts Receivable Radios	122.47	
Merchandise Inventory		
Tubes	75.15	
Parts	52.19	
Radio Receivers	105.76	
Equipment, Furniture & Fixtures	280.30	
Total		1103.64
Accounts Payable	172.14	
Notes payable	300.00	
	472.14	
Capital—John Doe	631.50	
		1103.64

Fig. 1.—Illustrating a statement of assets & liabilities with which the books are started.

Now, let us see what accounts you will find necessary.

1.—*Cash Drawer*—This is the account of the money you take in and pay out *other than that* which is deposited or withdrawn from the bank.

All money received by the business is debited to Cash Drawer and all money paid out is credited to Cash Drawer. When a Bank deposit is desired, the amount is credited to Cash Drawer and debited to the Bank a/c.

2.—*Bank a/c*—To this account is debited all money deposited in the bank and to it is credited all money withdrawn from the bank.

3.—*Accounts Receivable*—Here we will find all the money *owed us* for goods and services. We *debit* a/c Receivable when we want to show this money as owed us, and *credit* a/c Receivable when the money is paid us.

4.—*Accounts Payable*—Here we will find all the money *we owe others* for their goods or services. We *credit* a/c Payable when we want to show this money which we owe others and *debit* the same account when we eventually pay the money.

5.—*Purchases Accounts*—This may be one or one hundred accounts showing the *types* of merchandise purchased. I recommend *three* accounts, (1) *Tube Purchases,* (2) *Parts Purchases,* and (3) *Radio Purchases.* If you do not handle radios, you can drop the third account. When you purchase an item, you *debit* the proper Purchase account, *crediting* it if you subsequently return the item for credit.

6.—*Sales a/c*—This may be one or

Cash		Bank						Sundry		a/c Rec.		a/c Pay.		Int.
Dr.	Cr.	Dr.	Cr.	1940				Dr.	Cr.	Dr.	Cr.	Dr.	Cr.	Dr.
XX		XX		3	1	Cash & Bank Bal.			XX					

Fig. 2A—Right-half of journal set-up.

a/c Pay.		Interest & Disc.		Personal		Purchases				Expenses						
Dr.	Cr.	Dr.	Cr.	Dr.	Cr.	Radio	Tube	Part	Trans	Labor	Expen					

Fig. 2B—Left-half of journal set-up.

Sundry		a/c Rec.		Date	Sales Journal	Inv. No.	Sales Distribution					
Dr.	Cr.	Dr.	Cr.				Labor	Tubes	Parts	Sets	Sales Tax	

Fig. 3—Sales Journal Headings.

NAME Accounts Receivable
ADDRESS Control

Date 1940		Items	Folio	Debits	Date 1940		Items	Folio	Credits
3	1	Repairs.....	1	64 .25					
	1	Radios.....	1	122 .47					

Fig. 4 Showing set-up of "Accounts Receivable."

one hundred accounts showing the *types* of merchandise sold. I suggest one ledger sales account with a split-up in the journal on (1) *Tube Sales*, (2) *Parts Sales*, (3) *Set Sales*, and (4) *Labor Sales*. Remember that you *credit* this account for each dollar's worth of sales, *debiting* the a/c if the customer returns the goods or if for any reason there must be an adjustment.

7.—*Equipment, Furniture, and Fixtures*—This account lists your tangible property which has any value such as —Service bench, tools, manuals, books, test instruments, etc. You *debit* these amounts to this account, *crediting* the a/c as the *value* of this material decreases.

8.—*Notes Payable*—When you borrow money to use in your business, you *debit* this account. When the money is repaid, you *credit* this account.

9.—*Notes Receivable*—I doubt if you will ever use this account, so don't include it and you will probably save money. A Notes Receivable account is used only when you (the business) loans money to someone else. The account is debited when the money is loaned and credited if, as and when, the money is repaid. Usually these are loans which are to friends and without security. Save your money and use it in your own business. Forget that there ever was such an account as Notes Receivable and you will be "in" money.

10.—*Sales Tax*—In states where a sales tax must be collected and turned over to the state, a *Sales Tax* account is necessary. *Credit* this money to the Sales Tax account as you collect it and *debit* the account when you pass on the money to the state.

11.—*Salary a/c*—Your time is worth something. You should *debit* this account every month with an amount of money equal to that which you would have to pay someone else to do your work.

12.—*Labor a/c*—You should debit this account with all money spent for labor other than your own. (Such as that of an assistant, a stenographer, etc.)

13.—*Personal a/c*—This is your record of the transactions made between *you* and *your business*. Thus, when the business pays a *personal* bill of yours, your Personal a/c is debited. When you receive a salary, this is *credited* to your *Personal* a/c.

14.—*Expense a/c*—One of the most important accounts on your books. YOUR PROFIT IS MADE OR LOST RIGHT HERE! Your business' expense account is debited when you pay rent, heat, light, water, telephone, car expense, etc., as well as practically *any other expenditure* except for *stock* or *furniture* and *fixtures*. Thus, when you buy advertising, or a knick-knack to hang on the telephone, or a pot of paint to touch up those worn places, or a ticket to the local Policeman's Ball, you debit the old expense account. Of course, you can split it up into transportation, car expense, charity, advertising, shop modernization, etc., but it is all *expense* and can usually be handled in one account. What is a *worth-while* expense and what is a *foolish* expense is a matter for you to decide. It's your business.

15.—*Interest and Discount* a/c—When you pay interest on a note, or receive a discount because you pay cash, you use this account. If you need money and have an opportunity to get your goods at a discount for cash, you can often borrow money from the bank, pay them interest and still come out on top because you can take advantage of the 2% cash discount, on your current bills.

For instance, let us assume that you have bills of $200 to pay each month. Let us further assume that if you pay these by the 10th of the month, you will be allowed a 2% cash discount—or $4.00 in this case. If your credit is good at the bank, you can borrow $200 for 30 days at 6% interest or $1.00. By paying the bank $1.00 you save $3.00, the Bank furnishes your business working capital and you make a profit on the transaction. Of course,

(*Ring in on page* 50)

A/C Payable Control
3/1—$172.14

Tube Purchases
3/1—$75.15

Parts Purchases
3/1—$52.19

Radio Purchases
3/1—$105.76

Equipment, Furniture & Fixtures

3/1 Bench	$75.00
Tube Tester	50.00
Signal Gen.	30.50
Small Tools	15.00
Manuals	75.00
Other books	20.00
Elec. Drill	14.80
	$280.30

Notes Payable
3/1—$300.00

Capital or Net Worth
John Doe
3/1—$631.50

Sales

Sales Tax

Salary

Labor

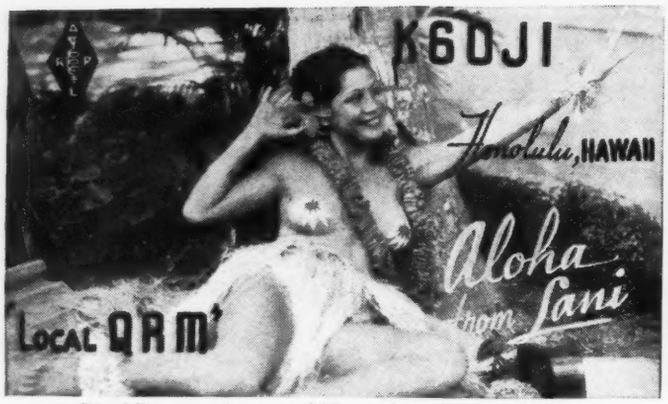
Personal—John Doe

Transportation (Freight & P.P.)

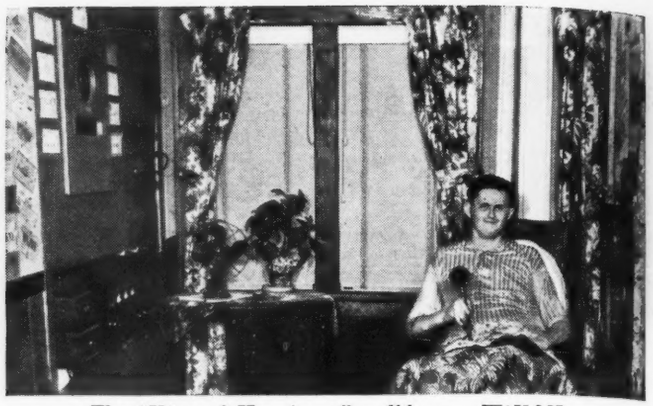
Expenses

Interest & Discount

Fig. 5.



World's most famous QSL card is that of K6OJI.



The "King of Happiness," well-known W9KOH.

HAM CHATTER

The recognized medium through which all ham gossip is disseminated. This is where you will meet your old friends and read about new ones.

SEEMS like everything runs in triangles. You know, first there was Adam, Eve & the Snake. Then there was She, she & him. And of course you have all heard about the one. He, Him & her. No matter where you go, things are by threes. Like Oscillator, Amplifier & Modulator; or Hook, Line & Sinker.—Tom, Dick & Harry.—The Three Fun-loving Rover Boys.—and Mom, Pop & U. So it goes and sometimes funny things develop in the trios. So much fer the buildup.

Well in our town—not a big one, mind you—there was a *W7*—, his pretty swell XYL, who was *W7*—, and the rig! (See! There's them 3's again!) They lived in a fairly nice apartment of 3 rooms,—bedroom, bathroom & hamshack. Every day the OM would go to his work, the XYL to her's and the rig would rest. At night, he'd operate, then she'd operate, and the rig would put out their sigs. (Darn those 3's.) Things were super fb.

Came the day that a junior op arrived at 3 a.m. in March.—yep, you're right, the third of the month.—and things went to Hades! No more operating, no more nice apartment because they had to get larger quarters, and the XYL had to quit her job. The magical trio had been busted up. So what? So the rig went up the flue fer to pay doctor bills, the license became dead for want of operating, and the XYL was too busy even to think about radio. As hams, the *W7*—*'s* were a total loss!

Now what we are driving at, is that that just goes to show that you can't bust up a triangle without everything going to pot. But then a long, long time ago, *Pithagorus* (remember?) said, "A triangle is the most staple geometric figure."

Silly, ain't it? . . .

THERE are more ways than getting across the hi-voltage supply for a ham to get killed through the medium of hamdom. Consider the sad story of these two radio hamops.

In Surrey, England, lived a *G* whose daily pleasure was to QSO a *D* in Berlin. Their QSO's had lasted over a period of many years and they had gotten to know each other well. They were more than friends, even if they had never seen each other. On birthdays, Christmas and holidays they exchanged cards and their QSO's became so fraternal, that their *Damon-Pythias* relationship was the talk of the twenty meter band. Everybody knew of *G*— and *D*—.

Came the War, and both shut down after a quiet, but moving last QSO. After the unpleasantness was over they would meet again, and pass along *Ws* and *Dx* reports. This they promised each other.

G— was assigned to a machine gun squad somewhere in France, and *D*— also became a machine gunner. First *D*— went to Poland and later found himself on the Western Front. Neither had gotten even near a radio set of any sort, and each was soooooo unhappy about it. They kept up their code speed and drew diagrams in the dirt to stay in touch with the developments in the ham-art.

Came a day when *G*— was on duty overlooking what might have been called "No Man's Land" in the last war. He couldn't see a thing, but he had been told that the enemy was across from him, and to keep his eye peeled and the enemy from advancing.

Suddenly he saw something move. It awoke him from his revery in which he was figuratively tapping out a CQ on his set at home—far from the Front. Unconsciously his finger pressed the machine gun trigger making the characters C and Q.

He was startled to hear an enemy machine gun distinctly "answer" with "QRD?".

More in jest than in anything else he machine-gunned "G—" his call. The enemy came back with, "D— hr, hw nw OM?" *It was his old buddy!*

The two exchanged information as to each other's health in machine gun bursts, and signed off with a CUL.

Unfortunately for our two heroes, the commanding Sergeant of each army also understood the code, and had intercepted the messages. Each was called upon the carpet. And each tried to explain. No soap.

Now get out your handkerchiefs, because they each refused to continue with the War, and so there was nothing left but to shoot them, which was done.

Sad. . . . ain't it?

SAYS Gene:

There was a ham, a W 8 . . .
With "safety" he always was late,
His insulation broke down,
For a loss he was thrown,
Now he's pushing up daisies. Worm-bait!

[*After all, Gene, have a heart!*]

BUD W9BDO Crawford, "buds" in with:

Practically all stations mentioned are being heard nearly consistently even in "daytime" as both 160 and 75 are "wide open" days now, here in western Nebraska.

9BBS appeared on the surface one morn es shouted "Hello" to the neighbors on 75 es 160 F es then promptly submerged agn es went back to usin 't his "hearascope" (beam atop a 75 ft. pole).

9BJU the red-headed op Mabel is on 160 F es 80 CW agn wid wat equipment was salvaged fm fire tt destroyed their home.

9COU, Mac the old Scot is still takin' the dough fm the BCLs in electrical equip—sum activity on 20 F.

9DFF after commercial op'ing around the U.S. is nw bak home at original QRA es renewing acquaintances on 80 CW.

9GKZ same QRA same biz, is content to solder joints es pursue DX wid the "$" sign rather than on 20 es 10—pro tempore.

9ERW used the wire-stretcher on his ant es is nw up on 160 CW getting readi to use his tenor on 160F wid abt 10 W inp fm vibrapak es b a regular member of the morning es evening lambast sessions of the "Raspberry Club," YLC, QWD, WRY, TIF, BJU, FXN, BDO, ZQZ [*all W9's*, Ed.] es now es then others jine in on these verbal tilts.

9YUM QRT the "Razzberries" wen Uncle Sam accepted his enlistment in U.S. Army Air Corps es is nw at Chaunte, Ill., Randolph Field, enjoying the life of a buck private es "larning" the rudiments of utility radio.

9FAM the old SCM who lo these mani yrs persisted in shaking his fist as a means of QSO has finally shown signs of becoming "civilized" es is hrd using his jaw on 75 F. FB! Sam!

9GTG es 9OHV staid wid the beacon stn wen Uncle Sam threw the C-A-A tuk over thr.

9ARE "bosses" 'em on maintenance.

9GXO was on 40 CW wid lil 6L6 rig es vibrapak, es doin' OK.

9HNG ops for the gabby show nites, es mastered *Cathode Mod* putting out a dandy quality sig on 160 F.

9ISJ is relief Morse op for U.P.R.R. east of North Platte es lil time for ham rdo nw. 3rd harmonic in family recently, too!

9JCB has 450 watts on 20 es 160 F, but ant nsg 4 160. Tri 75 F, Bill.

9KPA the ol' "lend me a fiver" bank clerk, thinks fone men are "sissies." First ya gotta get an RF section gg; then, tri spreading ur voice on it KPA es find out if U as a ham ain't still got a lot to "larn." Sew Furr, all ya got is the RF.

9KLD sold his rig! Seems as tho Virgil had bn trafficing in cheap rec'rs to BCLs who hrd him plenty gud! They kept "insisting" on telling him about it, so biz b4 pleasure won out.

BUD continues:

Different wid me—I won't sell tt kind rec'rs. I keep tellin' 'em about their "unlicensed" radiations bothering me on 75 off those lil shielded oscillators such sets have. I don't bother decent sets es they know it! Those "local type" rec'rs R gg to hear a "local" when it's on! Also, remind 'em tt ham transmissions R not "public secrets" like BC stuff—more of U hams shud do likewise. Yep; 3-sides—the BCL's, mi side, es the right-side! Hi.

9LEF hrd wrking dx wid nice sigs on 160 at noon nw.

9LXI very "dry" farmer, supplementing wid orchestra wrk. 10 es 160 F.

9MYR in his last yr in hi skool.

9RYV since they got thru making sugar beets into sugar has renovated his audio end es hearin' him is easy nw on 75 F.

9RGK built a new screech amp for 9QQS wich shud b much btr for "Wild Bill" than his old "serious" mod system.

9OGS competing wid ol' Bennie 9WWY—wiggle, wobble es vibrate—who QSYd to Hastings es acquired a YF! Competish is on 160 F. Hi.

9OTQ—oats, tax es quinine—new 3rd harmonic es rdo suffers QRM.

The Platte Valley Radio Club "Away up in Western Nebraska and down in America's Valley of the Nile" is really a going concern. The members persist in "going" to every meeting regardless of the 50 or 200 miles trip it entails. 9SDL is sec'y.

9TIP is making "the BCL's unhappy" near Monroe, es everybody knows tt Columbus power plant won't run unless "Uncle Wally" is thr to supervise it's actions.

9TKK—if ur YF sighs es gets a dreamy luk on her face, it's a safe bet she es a millun other YV's R hearin' of Jerry's mellow bellowtone cumin' outa the spkr. Don't fret OM, Jerry's a "safe old bachelor."

9VFL—old Dinty Moore's "9 very fine ladies" on 160 es 75 is heard wen Dinty is not teachin' mama's darlings their 3-R's.

9VST—very short throw—is a new one on mi 160 dial. Nice sig.

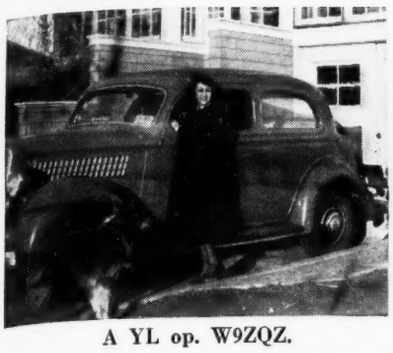
9WBX is among those absent on 160 this year—10 exclusively.

9KQC I find may b hrd vy early in morn on 160—bedtime 4 me, Looie.

9EKP es 9GDB endeavor to keep the "white spot" gang going on 75 on Sun eve's.

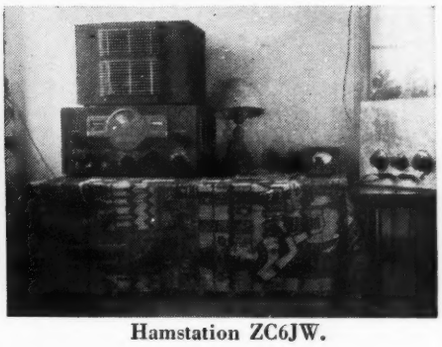
9WRY drove 170 miles to hv 9BDO "oversee" him construct a 12 watt vibrapak rig for 160 F es 80 cw, es likely he "overheard" wat 9BDO sed wen he got his finger blistered off RF in the "mike"! Apparently defective "mike" as another cured trub entirely!

9ZQZ—zippy queen zowie—the ranch-owning romantic skoolmar'm who started ham career on 40, then to 80 es later 160 F; reverses and now "radio romeos" may find the gal Oliva on 10 F



A YL op. W9ZQZ.

Hamstation W2JT.



Hamstation ZC6JW.

on holidays and sum week ends when she is home. Still a YL, sweet 16, etc.

Tt concludes this spasm abt "white spot" hams; nw 4 the neighbors whom we hr es QSO regularly es count as "radio friends."

SAYS Bud further:

In Colorado, 9DKK tells me he has bn thr since 1936, QSYing to get outa the dust storms in his original QRA.

9IVT—I won't talk—Warren intersperses QSOs on 75 F es DX 20 F wid home movie hobby.

9WGO—"Bob" the red headed young fellow, fixes the BCLs rec'rs es gets paid for so doin—not squaked-at like us fone fellers!

9FQK—"Prof" is instructing again at Gill.

9NKR is apt to be hrd on most any band—fone or CW.

9KNZ "Hans" operates fm his bed at Hospital in Denver. The gang all wish U improved health, KNZ.

From the "Sunflower" state, we often hear CRU the BC op at KFBI.

9KXB the printer, and 9ZVP the "eats-man" ragchew es DX in the "early hours."

9ESL is hrd nw es then during daylite hours for those of you who recall him "way back when" es wonder what became of him. Teaches in Academy at Atchison.

9FLZ "Christy" on arguing with the "Polecat Club" around bkfast time. W9CHE, W5AOX regular smellers in this varmint club.

9FYX hears to be abt the onli occupant fm Soo Sittie, Ioway on 75 F.

9PEO with his distinguishing voice represents "tulip town" same state.

Es, at the capital, one bird in the wx bureau mis-represents it wid his bullheaded boneheaded "3 ft. of wire" for a rec'ing ant! Has vy FB xmtr es gets a lot of calls fm hams he ought to hear but don't without a decent inhaler. A heluuva lotta QRM all 4 no gud reason wid these guys wasting pwr es space in vain calls, as he simply don't hear 'em under actual R8 plus it seems. Such dumbells ought to b compelled to use a '99 wid ½ W imp 4 a yr!

South Dakota has nice bunch of hams. 9ADJ—ace deuce jack—used photo of his rig es self as Xmas QSL. Vy FB, Clyde. Hams everywhere like to QSO Clyde as he has gud xmtr es rec'r es can hr U if U R hearable a-tall! And, a gentlemen with all.

9BDF "Mac" the professor, uses 75 F for the family gossip with his son at QLK going to school of mines.

9BGB is heard rather spasmodically on 75 F.

9BJV acquired a YF last fall—Nope, not so much ham wrk nw!

9DYM sandwiches QSOs in between customers at filling station and fighting insects in his cathode mod rig—get flit gun, Walt!

9FLM—funny little man—is superintendent of power co thr and as always does considerable experimenting in radio. Gud op.

9IYN es radio-bride May 9EPH nw live at New Underwood running a light plant there, and using 160 fone 4 family gossip wid LLG.

MORE "BDO-dor" — [*Excuse it, please.* Ed.]

9OQQ Art es 9OQE Lilly hubby es wife enjoy their hamming very much.

9OZE has bn puttin' in one of the top 160 F sigs mi ears hear here.

9TAV Ed the lecertician at Homestake Mine now is with us on 75 F. Ed sez he don't get to see any of the gold they dig out—the paycheck?

9VQC—very quickly caught—Frank was, in June, by Hazel. On 10 now.

So wuz 9URQ by "Calamity Jane" when Cliff was melting rosin at Deadwood. Anyway, Cliff tinks Lydia is R9 plus es we hams hope they live happily tt-way ever afterwards wid no QRM er QRN, etc.

9WZH the D.D.S. and 9ZBU the RR agent may b hrd on 160 then es nw.

In the backyard to west in Wyoming, we nw heard W7DZI-7 op'ing in capital city on 160, as duz ol' regular W7BCL; es sum on 75 F but mostly 20 is "Cowboy Eating Onions" W7CEO.

9FFW cusses lack of voltage at his QRA in trying to use 160 F.

9GEE "Atop the world" at Laramie on 75 es gg 2 skool.

9HEY ex-W9FXJ druggist clerk es DXer.

Montana has the "breakfast clubs" on both 75 es 160, wich are "toothpick clubs" at mid-day. W7DXQ—9CT—9CPY R telephone men who "enjoy" fixing lines during storms. 9BCE is hrd first time in many years here on 75 agan. 9FLT is a newcomer on 75 using home-generated AC wid attendant noises. Hi.

W7GEF es 9FHC R DX on 160 es much sought by those in east for WAS.

Nearly forgot W7ATJ Ed who used to use ham radio for contact wid outside world wen he was homesteader all by his lonesome a few years ago—is now at Lusk, Wyo., in garage biz. 160 mostly.

W5EAK—eggs, apples, kraut—who ever heard Milo in action with his "chapters" (QSOs) but what lafftalot! Milo goes "luggable" W9 in spring and summer putting in and harvesting wheat in S. Dak.

And, if you don't giggle a trifle at all that goes between W5HNR's "I'll be a hearin' ya" you undoubtedly hv lost ur skoolgal figger in failing to appreciate this Arkansaw humor, as he blares forth on the evening sessions of the "B&SB network."

To U CW men: I hv not intentionally slighted you. I simply hv not workd 40 4 abt 3 months

What we may expect if components get any smaller.

es wen I did I failed to click wid many of U "locals"; and on 80 I jist-ain't-bn 4 mani moons tho do wrk sum of the neighbors on 80 wid me on 75. Mi CW copying is NSB but mi CW sending is worst than bad! Bad wrist. So 4 gud of all concerned, I use key darned lil. Then, too, CW is altogether too slow compared to my output around 500 WPM on gab.

73, de Dubblya Nine Bit Dawg Once.

RECEPTION of trans-Pacific amateur stations has been dealt a severe blow by the present unsettled world conditions. A great many countries have already issued unconditional bans on all "ham" transmitters, and in those nations where amateur activities have not been formally curtailed many operators have voluntarily closed down their stations to serve their country. Many governments have gone even further by ordering hams to tear down their rigs.

In spite of all this, however, we are still hearing an occasional voice from a country where such a ban supposedly exists.

To date, the following countries have clamped down on amateur transmitters in Asia, Australasia, and Pacific Islands: Australia (VK), Bahrien Islands (VU7), Borneo (VS4), Burma (XZ2), Ceylon (VS7), West Samoa (ZM6), Sarawak (VS5), Fiji Islands (VR2), French India (FN), French Indo-China (FI8), Hongkong (VS6), India (VU), Malaya (VS1, VS2), New Caledonia (FK8), New Hebrides (FU8), New Zealand (ZL), Dutch East Indies (PK).

Although this unfortunate situation has resulted in the disappearance of thousands of trans-Pacific hams, there is one compensating advantage for the ardent DXer. The elimination of the powerful Australians has cleared the 20 meter band for some *real* DX, and a great many new Asiatics are being logged regularly, both on phone and on CW.

A great many Chinese stations are now being reported on the 20 meter band between 4 and 9 A. M. XU8 transmitters, most of them located in Shanghai, seem to have been the most active. XU8RB has been reported innumerable times on frequencies varying from 14.08 to 14.11 meg. XU8AM (14.08 and 14.13 meg.), XU8ZA (14.07 and 14.05 meg.), XU8ET (14.09 and 14.14 meg.), and XU8LA (14.12 meg.) have also been logged many times. Other XU8 phones heard during the past month include XU8NR (14.27 meg.), XU8HB (14.26 meg.), XU8MC (14.28 meg.) and XU8RM (14.15 and 14.28 meg.).

XU1B, located in Canton, and the only XU1 reported for several months, has been coming through with excellent volume on an announced frequency of 14.134 meg., although dial reading appeared closer to 14.16. During a recent QSO with W5FNH, XU1B pounded in with the strongest signal ever recorded from a Chinese ham.

Although XU2's are supposed to be off the air because of the present "unusual" situation in Tientsin and Peiping, two CW stations, XU2JR and XU2MC are still on 14.35 meg. irregularly.

Canton's XU6KL has been very active recently, and has been logged many times on 14.04 meg. XU6TL which was an old stand-by several months ago, is still with the Chinese army, and his rig has been dismantled.

For CW fans . . . the following have been reported on CW: XU8MA (14.37 meg.), XU6UK (14.39 meg.), XU5LT (14.37), XU5YT (14.25 meg.), XU4CV (14.40 meg.), XU6O (14.37 meg.), XU8HM (14.40 meg.), XU5HC (14.30 meg.), XU8WS (14.40, 14.35, 14.38 meg.), XU7A (14.40 meg.), XU6AL (14.30 meg.), XU8KW (14.36 meg.), and XU6AL (14.30 meg.).

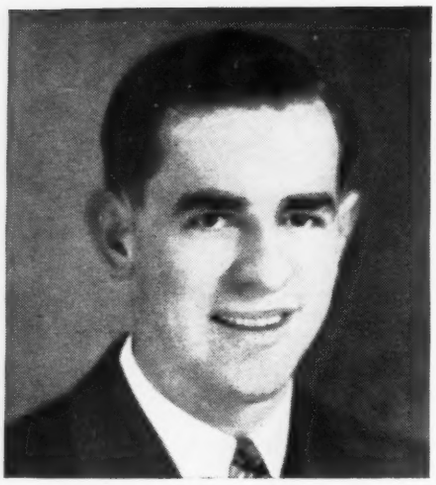
No XU3, XU7, or XU9 stations have been logged on either phone or CW. XU3GG and XU7HV are supposed to be active, but reception has not been reported in this country. XU3GG was formerly AC8JS, and is now operating in Tsingtao.

THE 20 meter band has been literally overrun with Philippine amateurs during the past few months. From 5 to 8:30 A. M. it is often possible to log 12 or 15 transmitters with good volume, and a few more are audible occasionally near 10 or 11 P. M.

KA1FH (who, by the way, has an excellent QSL card) puts out an excellent signal almost daily, and has been reported on 14.18, 14.28, and 14.27 meg. Other Manila hams who have been exceedingly active during the early A. M. hours include KA1ME (14.275, 14.206, and 14.145 meg.), KA1CS (14.193, 14.17, 14.27, and 14.135 meg.), KA1AP (14.218, 14.14 meg.), KA1CW (14.206, 14.15, and 14.17 meg.), KA1LZ (14.26 meg.), and KA1LB (14.13 and 14.27 meg.).

Frank KA7EF Mabry has been on the air quite often, and a recent QSO with XU8RB near 8 A. M. has been reported with tremendous volume by many west coast listeners.

Other less reliable KA1's follow: KA1JP (14.13 meg.), KA1ZL (14.375 meg.), KA1AF (14.156 meg.), KA1SH (14.26 meg.), KA1BB (14.265 meg.), KA1ER (14.27 and 14.08 meg.), KA1OZ (14.137 meg.), KA1BH (14.12 meg.), and (14.145 meg.), KA1JM (14.29 and 14.04



AARS, 5th C.A. Hamop W8LAU.

meg.), KA1MM (14.13 meg.), and KA1PL (14.14 meg.).

KA2OV, the only K2 listed, was heard once using CW on 14.27 meg., but reception was very poor.

KA3RA, located in Camp John Hay, Mountain Province, has been logged twice on 40 meters about a month ago, and has not been reported since that time. KA3KK, another of the four listed K3's, was on about 14.3 meg. near 8 A. M. twice.

KA4LH is reported only once on 14.13 meg. phone, and KA7HB has been reported only once on 14.25 meg. CW.

JAPANESE stations are still supposed to operate only from 11 P. M. to 1 A. M. and 5 to 7 A. M., according to a late communication from Tokyo. Nevertheless, many transmitters have been on the ether waves at other hours of the night and early morning.

J5CW (14.095 and 14.07 meg.) and J7CB (14.08 and 14.11 meg.) are two of the most reliable Nipponese hams, and are still being heard almost daily in this country. J7CR (14.01 phone and 14.27 CW), J2KG (14.09, 14.19 phone and 14.4 CW) and J2NQ (14.26 meg.) are also frequent visitors to America's west coast. J2MI, unlisted and reported to be using portable in Mongolia at the present time may be heard with fine volume on 14.09, 14.11 or 14.18 meg.

Other Japanese stations logged during the past 30 days include J2OI (14.03 meg.), J2PU (14.09 meg.), J2KN (14.05 and 14.35 meg.), J2NF (14.16 and 14.37 meg.), J2XA (14.16 and 14.33 meg.), J2KJ (14.05 and 14.34 meg.), J2LL (14.02 meg.), J4CT (14.10 meg.), and J6DU (14.17 meg.). The higher frequencies are usually used for CW.

If you understand the Japanese language, try 40 meters. A number of Nippon's hams are now using this band, but they usually employ only the native tongue. A few occasionally use CW.

Two stations in Korea, J8CI (14.105 and 14.20 meg.), and J8CA (14.25 phone and 14.395 CW), are being heard regularly by a great many fans. The former has an extremely fine QSL card that is well worth sending for. J8CI, also located in Korea, works CW on both 20 and 40 meters.

Japanese phones are best heard near 5 A. M., P. S. T., at the present time.

ALL PK stations have been ordered to close down by the British Government, but a great many are still on the air and being heard quite regularly in America with good volume usually from 5 to 8 A. M., P. S. T.

Eastern Java is well represented on 20 meters by PK3WI (14.13, 14.035, and 14.05 meg.) and PK3BD (14.07 meg.), two of the strongest PK transmitters on the air at present.

From Western Java, PK1RI (14.03 phone and 14.33 CW) is probably the most reliable. Others which are heard less frequently include PK2AY (14.03 meg.), PK1MF (14.05 meg.), PK2LZ, (14.03 meg.), PK1OG (14.08 and 14.04 meg.), PK1VM (14.09 and 14.075 meg.), PK1AS (14.09 meg.), PK1JR (14.06 meg.), and PK1TM (14.06 meg.), and PK1RS (14.085 meg.).

Three stations in Sumatra make up the log of PK4's for the last month. PK4KS (14.04 meg.) has been received quite often with surprisingly good volume, while PK4MM (14.00 meg.) and PK4RM (14.01 meg.) are considerably weaker. A W6 was heard calling PK4DG, but there was no sign of this one on 20 meters.

Dutch Borneo will have to be given a blank. One PK5 station was reported by two listeners on about 14.04 meg., but neither was able to determine the last two letters of the call.

The following PK's were on CW: PK1TT (14.34 meg.), PK3HI (14.29 meg.), PK1HX (14.26 meg.), PK1TM (14.34 meg.), PK3ST (14.30 meg.), PK4AU (14.31 meg.), and PK1BX (14.35 meg.). PK1FO and PK5AB were working on 40 meters.

TIBET . . . Three listeners report a real prize catch—AC4YN, located at the British Political Mission, Lhasa, Tibet. Try this one near 6 A. M., P. S. T., on about 14.10 meg.

SIBERIA . . . No phones allowed in U. S. S. R., but the following have been reported on CW: U9AX (14.36 meg.), U9ML (14.40 meg.), U9BC (14.40 meg.).

BURMA . . . Although stations in Burma have been ordered to close down, an unconfirmed report states that XZ2DX and XZ2BH (14.03 and 14.10 meg. respectively) are still being heard irregularly.

BYRD EXPEDITION . . . Remember that transmissions from the Byrd Expedition begin in February. Calls assigned are KC4USA, KC4USB, and KC4USC in 40, 20, and 10 meter bands respectively.

GUAM . . . KB6ILT is using phone on 14.24 meg., while KB6RWZ uses CW on 14.385, and KB6RSJ uses CW on 14.39 meg.

BAKER ISLAND . . . KF6QKH heard at 3:30 A. M. calling C2 on about 14.21 meg. . . . KF6PQL believed to be located on or near Baker Island heard on 28.4 meg. near 2 P. M.

FIJI ISLANDS . . . Government ban on amateur stations, but the commercial phone VPD2 is sometimes heard on about 14.30 meg.

FROM W7FHC, Luther, Montana.

Well the old amateur radio bands are buzzing with signals and the hams that are not working the high frequency bands in the daytime are staying up half the night, or getting up in the middle of the night to try any work DX. Yep—ten and twenty meter phones are sure rolling in here in the day and 75 and 160 meter phones, from 4:30 p.m. till 8 a.m. and sometimes later.

W7FFW of Cody, Wyo. is about wore to a frazzle, working the ten meter band in daytime and the 160 evenings and mornings, engineering on a government project, and trying to get a little sleep all the while getting behind on QSL. Have patience boys, he will probably turn the QSL dept. over to his XYL W7FFX who also works ten meters.

W7GFB of Powell, Wyo. can be heard quite regularly on seventy-five meter phone now days.

W7GBY of Powell, Wyo. is working twenty.

W7FTY of Chester, Mont. is working on 160 mornings now.

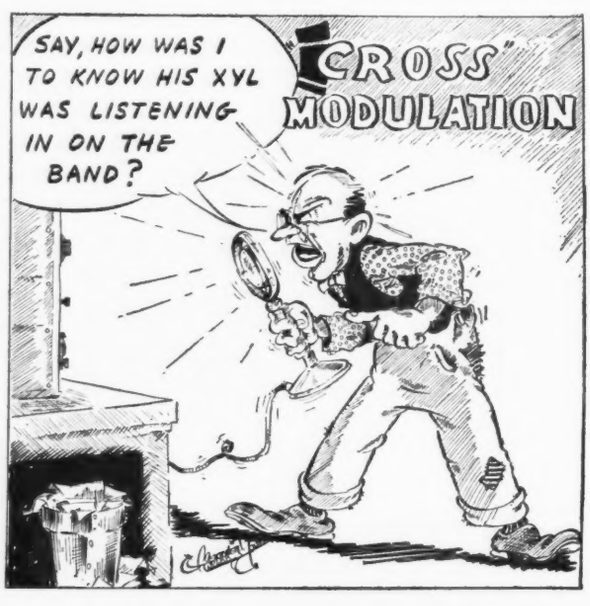
W7EGM of Wisdom, Mont. is working seventy-five phone most of the time now. Is on 160 occasionally.

W7FTX of Corvalis, Mont. is working on ten with a rotary beam antenna, and also eighty meter c.w. and 160 meter phone.

W7FYQ of Kalispell, Mont. is bursting thru the ether on 160.

W7DAJ of Laurel, Mont. has been knocking loudspeakers around with his 300 watts on 160; especially on army drill and also after 10 o'clock p.m. I hear. Hi!

But leave it to W7FXO of Scoby, Mont. to cause you to throw your headphones away and tie your loudspeaker down with a good new lasso. When he turns on his 500 watt—1 kw. from about one a.m. to five a.m. and works all districts but 6's. His only trouble is to hear them as the local QRN is quite bad at times. Have patience you DX hounds and stay with him, he will QSL if he hears a peep.



Foreign Hamop J8CD.

W7HJQ at Laurel, Mont. has about 40 watts on 160 and is having good luck working DX.

W7HUS of Dillon, Mont. is hitting the trail back to his old stomping ground at Watford City, North Dakota, where he used to operate under the call of W9YXB. We will probably hear the bark of the "Lone Wolf of the Badlands" soon.

W7HPE of near Cody, Wyo. is going to town with about 15 watts cathode modulated. Has a windcharger and vibrator power supply which works fine business.

W7HIJ of Greybull, Wyo. has changed to cathode modulation and now has about eighty watts on the air, and does he go to town (and how).

W7CZI and W7BCL are on 160 at Cheyenne, Wyo. BCL made a round visiting other hams lately.

W7CBL at Casper, Wyo. has 100 watts on 1950 kilocycles and can sure burst through the QRM.

W7ACG also of Casper, Wyo. is also heard on 160.

W7ATJ of Lusk, Wyo. is not on very often, but when he is he always comes in a good Q5R8T9 (Sounds like "code").

W7DXR of Roundup, Mont. is on after theater time and has excellent quality.

W7FOM of Missoula, Mont. is also making foam in the ether waves in this neck of the woods, with a nice signal.

W7BCE of Miles City, Mont. one of the old timers is active on 160. Welcome back again Paul. We hear you on 75 meter fone too, Old Boy.

W7AAT is working on 80 meter c.w. from Miles City, Mont. Why not get on phone again Orvy, and let that bug have time to cool off a little.

W7GEF of Circle, Mont. is on the air about every morning and gives us the cold weather report from that hot town.

The Army net, Colorado Phones Division, W and K are active in these parts at present, on 1945 kilocycles Monday evenings and wish to thank those that have xtals on, very close to the army net frequency, for Qsying or remaining silent Monday evenings during drill period. Their courtesy is greatly appreciated.

W7GPM Idaho City, Idaho, W7FDL, Rosalia, Wash., W7GIP, Boise, Idaho, W7GWI, Burke, Idaho, W7FOX, Orville, Wash., W7CJO, Hermiston, Oregon, W7DTF, American Falls, Idaho, and W7EYR, Caldwell, Idaho, have all been coming in with wonderful signals in Montana.

W7FHC of Luther, Montana, is on 1875 kilocycles and trying to work some DX mornings between 4:30 a.m. and daylight, and is especially looking W2's, 4's and W3's.

The W9's of North and South Dakota, Nebraska, Kansas, and Iowa are sure pounding in here. So 73 es BG de W7FHC.

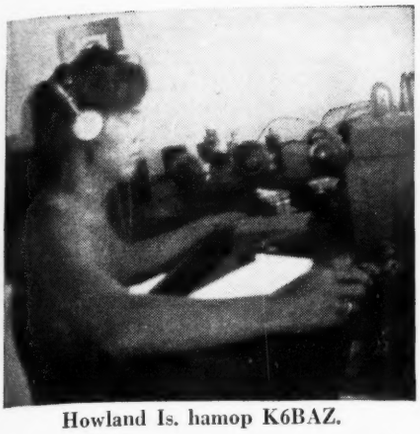
W8QZV states:

The DX hounds W8AA, W8TNN and myself are QRT to the higher frequencies because very little DX is heard around these parts. For the last two months 20 has been going dead early in the evening and it doesn't wake up until most of the fellows have gone to work but all are waiting till the DX flies in the spring.

W8ECZ who was QRT for 8 years is back on 160 and for Xmas his wife presented him with a Jr. op. Law of averages finally came Larry's way because he has five girls and finally a boy came around.

W8LAK has been busy building a boat, but has it done. His signal will be heard on 40 very soon and next spring we will be taking up boating as well as DX hunting.

Several new hams on and really putting Bay City on the map. Among them are W8TJO, W8SMK, W8TVK.



Howland Is. hamop K6BAZ.

Bis of W8DA has built a new house outside the city limits and will erect some good antennas as soon the sun gets back.

W8QZV received a nice QSL from ZS2G and that makes the DX fever bite even if there isn't any DX to work.

So that's the dope on the boys from NE Michigan and so until the next time. 73 de Augie.

FROM W9FPB.

W9IGU and W9NHZ are sister and brother ops at Coon Valley. Marian Lee, W9IGU, uses a 6L6G-6L6G-pp HY 40 rig with 140 watts input on 7185 kc. to schedule her brother Selmer, W9NHZ, who is not op at WTMC at Ocala, Florida. Marian is 18 and a beauty. Would send the proof of it if I could get the Photo back. Hi! Some of the boys might appreciate the pix in the column. *[Photo return guaranteed, so send it along.—Ed.]*

W9HW1 is another Coon Valley ham. He is on 7195 kc. with 25 watt input to a 6L6G.

W9EBI at Viroqua has a *Collins* 32G on 14,300 c.w. and 28,600 fone.

I operate W9FPB here at Camp. I have a 6L6 with 20 watts input on 3535 kc, but am building an 809 final, which should be on the air in a week or two. I'll be running 50-60 watts input then.

FROM The Mail Bag.

Dear Gang:

I want to congratulate you on the very fine work you are doing there at RADIO NEWS. Every article is very interesting and your *Hamchatter* section is getting better all the time. Keep up the good work.

Hr is one W8 who is going to make a point of contributing something each month to Hamchatter. *[True, OM. Ed.]*

Having just joined the A.A.R.S. recently, I'm really getting a kick out of my affiliations with the Signal Corps of the United States Army. I think more of the ham body should become interested because it really is swell.

The layout here is A.C.R. 136 RX. 616X osc. and 210 final with 60 watts input. The antennae are—*Johnson "Q"* for 20 meters and an end feed for 80 and 40. Frequencies hr are 3506, 3726, 3780, 7086, 7089, 7194, 14,178, and 14,354 kc. DX is W.A.S., VE's, CM2-6, K4, 5, 6 and 7, HK5, 12, Cr7, XE2, VP2, YV1, 5, and PY7. Need an Asian for W.A.C.

W8LAU is always ready for a good ragchew (my record is 3½ hours) and will QSP anytime and for anybody.

73, best of luck, 88 to the YL's and may this New Year be one of Health, Happiness and Success. Signed—W8LAU (Little and Ugly).

DON PARSLEY, the old-timer whose activity dates 'way back to about 1921, is still signing W4FT and putting out a swell signal on 10 meter fone. It's funny about Don. He has never been much of a technician as far as experimenting goes, but he has always taken a pride in his signal and never had had anything but the finest kind of a signal on the air. His fone sounds very good, and it sure gets out, via a 4 element rotary beam.

Another old-timer, Guy Pigford W4EC, has neglected his radio something awful here lately. Seems that photography is taking up the better part of his hobby-time. But we hope to see a revival of spirit within him soon, and no doubt, you'll hear more of him later.

Arthur Peebles, W4CPT, one of our most consistent experimenters has finally decided to do some actual operating. Arthur has always gone in for the technical side of radio without doing much in the way of QSOs. But, recently, he has purchased a Thordarson 100 watt transmitter and a *Hammarlund HQ 120X* receiver. We expect him to make the most of it on ten.

Four newcomers have recently joined our ranks. Namely, Walker Taylor W4GIQ, David Ormond W4GIV, Alex Hilliard W4GMM, and Cliff Smith W4GKW. All these fellows are using the well-known 6L6G tri-tet oscillator on 40 and 20 with FB results. All of them are high school students and we welcome the young blood to the great fraternity.

W4GFL, another new one, signs the name of Sidney Wilson, and may be heard nightly on 160 meter fone with a pair of T40s. Honestly, I don't believe Sid has missed a night on the air since getting his ticket.

Luke French, well known 20 meter fone who signs W4BJV is now running a radio shop here. He has just purchased a *Hallicrafter's Defiant* and is very well pleased. At present is running about 450 watts input.

Was talking with Dudley, W4EWP last night and he has finally chased the bugs out of his KW fone on 160. Dud has really spent some time on that rig. He has enough equipment in his shack to build a BC station and the last time I visited him, he had 8 (think of it) T150s laying on the table and explained them with the remark that they were purchased for a rig that he never did build.

Charlie Roethlinger W4US is consistency plus. Charlie has worked 40 meter c. w. for the past 9 years without ever becoming excited over fone or UHF. I hear him on quite often and always with the same fine fist and signal.

W4BQZ, Jimmie Russell is still on 20 meter fone. Haven't seen much of him lately.

W4BRK, Sam Sweeney spends most of his operating time with NCR activity.

W5HES es his XYL

Oh yes, W4EEL, Jesse Hodges is another good 10 meter ham. Jesse is now using a pair of TZ40s on ten with cathode modulation.

Ed Blake, W4CPA is the only licensed man in town who is not on the air at present. He hopes to be with us soon.

The writer of this hash, W4BPL, "Hump," has just completed a cathode modulated rig with 125 watts input on all bands down to 5 meters. If nothing happens, will enter the UHF contest this coming year. If any of the boys are interested in putting up a good copper vertical for 20 meters for less than 5 bucks, let 'em write me.

NEWS from Metropolitan New York, per W2ETD:

W2JIO instructor of radio at the N.Y. Institute for the education of the blind on Pelham Pky. in the Bronx is on 160 & 75 meter phone, students have built equipment and operate rigs.

W2LPM has joined U.S. Navy and is at training station at San Diego. He has his 160 meter port. rig with him and reports many W6 contacts.

DARLING, UR EYES ARE THE COLOR OF THE BLUE GAS IN MY 866's, UR HAIR IS AS BLACK AS BAKELITE, UR SKIN, AH, UR SKIN IS AS WHITE AS ISOLANITE, AND UR VOICE IS TO ETC.---
Alexander Radio

The well-known hamop FI8AC.

The old QTH of W2FPG is rapidly becoming the largest 50 million dollar 129 acre Metropolitan Ins. Co. housing development to accommodate 12,200 families in the Bronx.

We have over 600 licensed amateur stations in the borough of the Bronx apparently there are approximately 3,000 hams in N.Y.C.

Most powerful 160 meter station in Bronx W2LKP.

A very elaborate airway radio system has been installed at the Municipal Airport at North Beach.

W2ETD has worked 17 states on 160 & 75 metr fone using 3 to 12 watts input.

W2CKL has a new HT6 transmitter on 160.

W2EVL back on 160 phone with good old 46's.

Two prominent rotary beams on W2OM W2IVW & W2HWF.

A few cops on the air in the Bronx W2GPE W2KRD W2HKL W2GIY W2ETD.

The Hamfest at Queen Village had attendance of over 400 sponsored by Federation of L.I. Radio Clubs. W2FPT/W6PXH on 20M travels back and forth across the country.

W2GSE now located at C.A.A. station at Mt. Pocono, Pa., on 75.

Tony W2BJO an RCA oper. at Broad St. gets out fine on 75 & 20M with his 50 watts input.

W2DCF now married and remains a ham on 20 hear the XYL's name is Margaret.

W2JZH has trouble hiding his 160 M ant from the BCL's who trim it down.

W2BGO the old key pounder both on the linotype and 80 CW.

W2HIF was operating at the 105th F.A. Armory on 160 75M until recently with 50 watts input.

W2BOZ operator on S.S. San Vincente a freighter east to west coasts has a 10M rig 9 watts input to 25L6's and NC44 rec. on board.

Can't understand why W2FWZ doesn't get on the air again with his excellent equipment up in Yonkers.

A belated New Year's greeting card would not be a bad idea to the Canadians or other foreign stations you last contacted to keep up the old fraternal spirit.

W2USA continues active at the World's Fair with W2KU at the controls. The walls are well papered with QSLs from around the globe.

W2IPM away from home a student at Rensellear Polytech. Inst. in Troy.

Tell the "Ole Counstabule" W2GIY tt ye mngg ed of this rag sure misses the old moosemilk hour es the gang. He usta be W2GOW es nw sports W9QEA. Hi thr 2HXQ es 2EOA es does anione knw wats happened to ole W2GYH? Ed.

HAROLD D. MILLEN W1JOM shoots us:

W1ELP just came down on ten. Uses 6L6's with 35 watts and cathode modulation. Sounds f.b.

1KCW on 160 is using a KW, with 250th's in final. The rig is a "custom built" job.

1GEJ worked 9KVP who lived in Boston for 13 years. Herbie had a guide book of the important spots in the old "bean town" and gave Elmer a very fine word picture of Boston then and now.

1IUY an old ship operator (radio) just came down on 10. Cal is a c.w. man and we were surprised to hear him on fone.

1GCM has a uhx-10 and a 12 tube *Howard*.

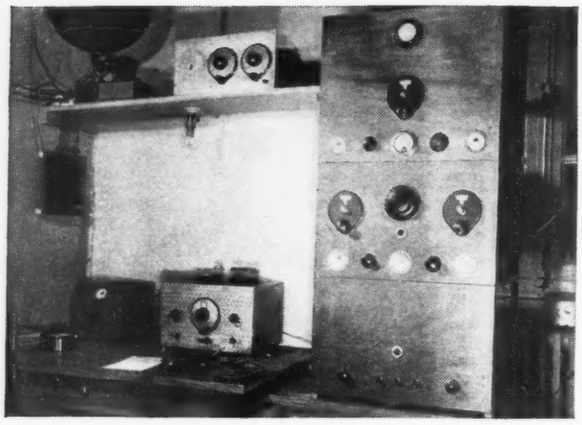
1JDE finally has his beam adjusted so that it really beams.

1LYH put up a new Twin 3-8JK beam. He is now using an 812 in place of the 809's to drive the 35T's to 450 watts.

1JTG who went up to Hanover, New Hampshire, to adjust the kw. at 1KCW arranged to have all the boys on ten listen for him at 8 a.m. in the morning, but when the time for the sked rolled around Charlie was deep in the "arms of Morpheous."

1GOU worked a station in Conn. (175 miles) on ten.

We've been having a tough time working the stations in the North Western states, but are having a much harder time getting cards from those states. Many of us are wondering if the boys



Pre-War Hamstation F8YS, a consistent dx QSO.

around Wyoming have their cards printed with gold ink. How about that, fellows?

1MCX a new ham on ten, came down from 40 c.w. Uses a 6L6 into a TZ-40 and 46's as modulators.

1BNJ returned to ham radio after a few years absence, thru the efforts of MGD.

1MBI just came on ten meters.

K7HQZ on 28,800 has been coming thru every night at 5:30.

1JRC just got back on the air after a year's absence.

1LMG running only 7½ watts on ten meters to a 807, really works out fb. Some of the boys think that Bill bribes the boys in the sixth district.

1LBB is back on the air. Sandy moved from Winthrop "by the sea," to Wellesley "the home of the co-eds." Hi, hi.

1IXL teaches a code class Sunday mornings at the Parkway Radio Association.

1LWS is operating portable in Brookline on ten meter fone.

1HOB was issued to Parkway Radio Association. The call was originally owned by one of the foremost Boston radio amateurs who recently passed away. The *FCC* reissued the call as the Club station. The transmitter being built will operate on 75-160-20 fone wid 300 watts. W1JRX building the power unit, and 1IBS modulator and 1IXL the rf.

1FH on 20 fone has worked Frank at KA1CS 45 times in the past 44 days, all reports being 5-9 plus. Charlie is running 200 watts to a Mims 10-20 beam.

K7HQZ worked W1GOU for his first W1 contact. They both claim that only vertical antennas are able to put a signal into Alaska. K7HQZ QSL's 100%.

1IPA working for *Polaroid Glass* and too busy for ham radio.

1EKH has a new rig—6L6, 807, HY25s and an *RME-69*.

1BZR over at *National* was heard speaking about the new *National* 5 band tuning unit. They plan on 3 units, 50 watts, 300 watts, and probably a 750 watt job. A rig using these units throughout will be soon built up by the staff.

1MGD just got on the air. Uses a 6L6 in the final wid abt 40 watts input on 46's as modulators. Receiver is a *Skyrider Defiant*.

1IXL planning a KW, and a 4 element beam.

1IGA built a ten meter job for 1JNV. Sounds f.b.. Edward.

1IIQ has changed his QTH to Arlington and is putting up a ten meter beam.

1CNF is doing some f.b. work on 2½ meters.

1EH is on 2½ and 1¼ meters.

1LTC has his ten meter beam up, thanks to the Herculean strength of 1GFW. Rudy did most of the heavy work while the rest of the boys did the looking on and shouting of instructions. He is a very obliging fellow, so anyone that wants a beam or antenna put up, start calling 1GFW.

Have you ever noticed how easy it is to get the gang over for a pole raising, or a meeting to get the bugs out of the new rig. Wouldn't it be a swell place to live in if the boys down at the office, in the shop, ur next door neighbor (the BCL who hears 1JOM all over his midget), that Sunday driver, etc., etc., gave us that kind of cooperation. I guess it can only happen in ham radio.

1KSF has rebuilt and is now on ten meter fone.

I wonder if you fellows know that a very complete and very accurate thesis on beam antennas and radio in general was written back in 1831? [*To be sure, we do!—Huh!!* Ed.]

1SS has worked 91 stations on 2½ meters in and around Boston.

1HDJ has a *Johnson* Q beam.

COL, FBX, JQA, HQE, MCB, LLD, are on 2½. [*All are WT's.* Ed.]

1HXP worked 1JDB who is located in Nashua, N.H. JDB uses abt 75 watts, Mel uses *Eimac* 75T's with 175 watts and a 4 element beam.

Bob Hall will be back on the air soon, but the XYL is not in favor of it.

1WV is tickled to death with his *Mims* 10-20 beam. Miles says that if he doesn't get an R9 plus report he starts looking for trouble.

Eastern Mass. Radio Association had a demonstration by one of the boys from *National* on those new a 11 band tuners.

1JKR is on 160 with a 203A in final and 4-46's as modulators.

It does my heart good to hear some of the boys on 2½ using 45's instead of one of those super power output, low input bottles.

1JKR has been busy for the last two months installing radio equipment on the "Wasp" at Fall River.

We get a great kick out of hearing a new fellow on the 10 meter band explain to some other station abt the flutter that is on the other boy's signal. Most of these boys come up from 2½ or 5 meters where they have never experienced this phenomena. It seems that whenever an airplane goes overhead, the local stations start fluttering. This condition is not common to other than local stations. We have also noticed that when listening to a weak local station, the plane approaching our location brings this signal up to an R9. It is my belief that it is clearly a case of reflection from the body of the plane (only metal planes cause this condition), but, we have also heard this theory—that the plane's propeller churns up the air waves and causes the flutter. Hi.

1JRC tells this very interesting and enlightening story. About six years ago while he was in New Jersey some of his friends suggested that they eat at a very special roadhouse located on the top of some mountain. After passing about a dozen and a half inns, etc., and driving thru narrow winding roads they finally arrived at their destination. This roadhouse made a specialty of Welsh rabbit so they all ordered it. The sandwiches were served while they were dancing. When they got around to eating them they were almost cold, but they were so hungry that it didn't make much difference to them. But when they bit into the Welsh rabbit, they were in for a surprise. Jim says it tasted like a cross between a rubber boot and chewing gum! Well, they left the place in a hurry, after paying the bill of twenty odd dollars and went to another place to eat. For the last six years Jim has been trying at various times to find out what kind of cheese was used in the preparation of the Welsh rabbit, but with no success. A few days ago Jim got home quite late and decided he'd get himself a little snack. After a visit to the icebox he made a sandwich of toast and melted cheese, etc. Upon biting into the supposedly tasty morsel, he again started to chew what to him seemed like soft rubber. Well to bring this to a quick end, it turned out that the cheese was "Munster." *And fellows, that cheese should never be heated, or else.*

A new fad and a pretty good idea has just sprung up around this part of the country, and it is just this; the use of tablecloths and curtains that have a map of the United States printed on them. They serve a double purpose, either as a map or a tablecloth or curtains as the case may be, and also have the advantage that when you need a map you don't have to go all thru the desk to find you left it in the bookcase. (Of course you will have to get the XYL's consent first). HVW now on ten meters with TZ-40's and 6L6's as modulators.

LEE MASON W8SPK, one the W8 Lee's suh, pours the coal with:

W8QBW is still bringing out those postage stamp rigs, his latest is the "Portable Five." It uses a 25L6-GT xtal oscillator and a 25Z6-GT as a rectifier. A fb portable rig with 5 watts output.

W8SAD has moved out of Detroit, claims too much man-made QRM at his former location, making it hard to hear those dx sigs. At his new QTH on the outskirts of Mt. Clemens, he has found that quiet spot, claims that the signals are coming in much better now. Also has plenty room for all kinds of antennas. Well, good luck, Morris.

W8TJD sure is putting out a nice sigs with his 250 watts on 40 meters from Columbus, O.

W8AIZ and the xyl were the hosts at the first social event of the new Ham social club known as the 13 Club. Yes, there are only 13 in this club.

W8KXX seems to be more interested in a certain yl than ham radio at present.

W8RRB has moved to Pontiac, Mich., to be nearer his new job at WCAR.

W8QUU got tired of pounding brass on 80, so is now vibrating a diaphragm on 160.

W8OGJ wants to get into some of that 10 meter activity, so is building a new fone outfit for 10.

W8UFI is one of the new calls heard on 160.

NEVER-SAY-DIE KEITH W4ARX MATHIS, of the Montezuma, Ga., Mathiscesesesses, potshots:

We are starting this off with a tall tale told to us by W4FDJ of Lyons, Georgia. It seems that at one time in his varied career he was chief dispatcher for a major railroad and had a man who he knew took advantage of the late night shift when there wasn't anything doing to take a snooze, depending upon his sounder to wake him up. It also seems that he was afraid of the supernatural, So Ernest one night called him several times on the Morse wire and getting no results took his telephone wires and placed them in the Morse circuit. He said "Why in thr H—L don't you wake up." The coil of the sounder acted as the receiver and so scared the operator that he jumped up and ran up the track. He never came back for his pay or was never seen again in that part of the country. Hi. [*Ah, there "Winchell" Mathis.* Ed.]

W4DIZ is a new ham on 160 at Lyons, Georgia.

W4FPH is on 160 with a FB rig at Kingston, N. C.

W4GLS is on phone at Chattanooga, Tenn.

W4GLW has new rig and is newcomer on 160 at Clarksville, Tenn.

W4IS is building new rig at Statesboro, Ga.

W4EZL same city is on 40 CW.

W4DBM is active with new phone rig on 75 at Midville, Ga.

W4GIA is becoming to be known as the Romeo of Georgia. *He has more girls than any ham we know.* Look out OM, that kind of stuff leads to a dangerous life.

W4GCD at Valdosta tells us that *RN* cannot be bought at news stands there. [*Circulation Mgr. of RN, please note.* Ed.]

W4AGI at Augusta, Georgia, for plenty long time operating on CW has new phone rig on 75 and his friends are wondering how come. Leland really can swing a wicked fist though and welcome to the elite OM.

Get Hot Willie down to Damascus, Georgia, recently visited:

W4FJM at Panama City, Florida, and is still explaining about why his car got washed. Loosen up, Willie, and tell 'em the truth. Hi.

W4FBZ at Evergreen, Ala., works for power co. and finds time for some ham work.

W4EFD at Montgomery, Ala., is at it again. By that I mean that it's aerial time with him, trying several and being unsatisfied with none of them. Boy that sig is FB in Georgia.

What has become of W4FPI at Opp, Ala.?

W4DOG is new ham at Atlantic Beach, Florida, near Jacksonville. He is on 160 and 40 with FB 30 watter.

W4GAA is being ragged somewhat about his DX. Hi.

W4CUZ at Sarasota is working with new BC station WSPD there and tells us that he will be active from there shortly.

W4CCT at Sarasota works for newspaper there and finds plenty of time for some phone operation.

W4AHK another ole timer is on 75 meter phone at Eustis, Fla., and OM here it is.

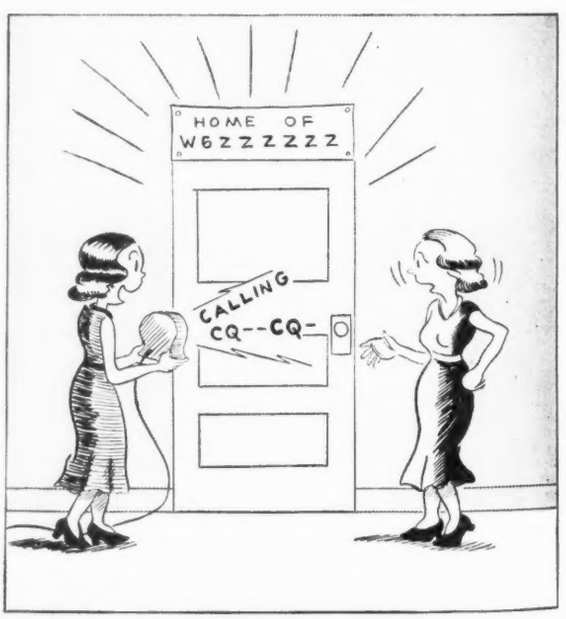
Although we recently visited Sarasota, Florida, we wish to apologize to the gang in that part of the state for not meeting all of you but previous business just didn't give us the time.

W4FDE at Cordele reports that he has been very sick but is recovering at present time.

4AUO spent a week in Miami recently looking at the bathing beauties we presume.

You Perry, Fla., guys could let a fellow know where to find you when passing through.

W4VX Columbus, Georgia, is still operating on 80 c.w. and also heads the 80 meter net for his sector. Jimmy is a swell fellow and has made



"This is the only way I know to wake him up!"

many friends all over the fourth district with his swell operating.

W4GEO says that spending a quarter is not much but thanks us for a recent mention in *RN* and also says that he now knows a better way to get *RN*. Hi.

Several of the Moultrie, Georgia, fellows are planning to start a new radio club there. Anything we can do is yours for the asking, fellows.

Not mentioning any names but one brother ham's XYL says that she still is a firm believer in the fact that dresses and so forth are much more important than ham gear. Well, here it is and just show it to the OM and try to convince him. After all we have been in the doghouse for so many years that we don't have to be told this. Hi.

With the summer months advancing we want to assure our one reader that we will remain on the job if *RN* will let us and will continue our policy of trying to report this as are. [*Will we letya? We will! You bet we will, es tnx.* Ed.]

GEORGE W2GFW FELBER, whose call by accident appeared in the Jan. '40 *RN* as W2GF*H*, and to whom we humbly apologize, smears across the page:

W2LCR is a new ham on 10 meters. Marvin made the mistake of trying to use a 20-meter crystal (really a 60-meter rock) in a Jones' oscillator and wound up on 15 meters! He's now using a 10-meter crystal and has everything under control.

W2GUH contemplates using another 809 in the final on 10-meter phone. Shep figures he'll have to add another pair of '46s in class B to modulate OK.

W3ILV is using a cathode-modulated rig with a pair of *RCA-812's* in the final. John has just started in ham radio again, although he was on with a spark rig in 1918.

W2GDC has his rig on 160-meter phone, but doesn't get on much. Since he works for *Arcturas*, George must get enough radio during the day.

W2MEU is quite active on 5 meters. He says he will be on 10 soon for some DX. Sven will have about 50 watts input.

W2MHA has a small 6L6 rig with about 15 watts input, which he uses for portable work. Art is able to work out very well with it.

Hey Ed., if you've gotten this far, what does *Time* mean when they say, "*RN* is neither pulp, puff-sheet nor good red herring"?

[*We've been a-ducking thet there one on accounta we're sorta friendly with TIME,—you know, just two swell mags, etc., etc.—but here's the answer. We ain't pulp on accounta we got no pulps (heart or otherwise); we ain't puff sheet becuz we don't have BIG ideas of our own importance; and we ain't herrings cuz we don't like fish! Seriously, though, we are not pulp because that term is reserved for PULP PAPER magazines; we are not a puff sheet for obvious reasons. The best known PUFF sheet,—and highly respected, too—is FORTUNE. The "red herring" is a left over from the proverb. Satisfied?* Ed.]

W2FZE seems to have given up ham radio in favor of photography. Bill could have bought a lot of microfarads with what he paid for that new projector he has.

W2HYZ hasn't been on the air from his own station for a year. Bert seems to get enough working other guys' rigs while he studies for his first class comm. ticket.

W2HMQ has dropped to 10 meters from 20. If you work HMQ, chances are Emil will be at the mike, as Stan doesn't do much operating now. They have an 8JK beam up on the roof which will soon be pushing out a real sig.

W2GOS has given up 5 meters and is selling out most of his junk. Excuse is that college takes too much of his time to fool with the rig. (How's that YL in the restaurant, Lou?)

W2LKO is working the gang on 160-meter phone. Normy had his xtal ground so now he's up on the high end of the band.

The most consistent Asiatic during the *Radio DX Contest* from what we could hear was J3FZ 28490 kc. Nope, we didn't hook him and that still leaves Asia to get for WAC.

W2COT sort of divides his time between 5 and 10 meters. He uses a pair of *TZ-40's* with 200 watts input and an double extended zepp with reflector for an antenna. Bruce has a very modernistic QSL.

W2JVF has a 6L6 osc. and an 809 final with 40 watts input on 40-meter c.w. He's not getting out too well tho' and Rudy puts the blame on the feeders of his zepp which he suspicions are too short.

W2IIS, who operated on 160-meter phone for several years, has of late tried 10 with good results. John is using about 100 watts input to a *Johnson Q* antenna.

W2KRN is wondering how to feed his antenna from the basement. When now pondering over this question, he can be heard on 40-meter c.w. with his PP-10's in the final. How's Marie, Charlie?

W2LLL can often be heard talking with W2KBS on 10-meter fone about roller-skating. It seems that both Emil and John are whizzes on the bunnion-buicks.

Add to the list of that gang who say they're "somewhere in Europe": ZZ1A 28325 kc T7.

W2LBL has a new rotary beam for 10-meter fone. So far Joe doesn't have any motor to run it and he has to go out in the backyard to swing the antenna. His 40 watts input sound a lot stronger now, tho'.

W2ALK has a portable-mobile rig now, too. He has a high-power fixed station on 10 and 20-meter fone, and George works out very well.

W2LXY, altho' having 600 watts input now,

(*Pse QSY to page* 44)

The VIDEO Reporter

by SAMUEL KAUFMAN

TELEVISION barely got under way on a public-participating basis when it was readily seen that there was little reliability in the theory that the tiny picture waves won't go beyond the horizon. Hence, this viewpoint has been altered a bit to rationalize that the signals may go beyond the horizon, but that such television "DX" cannot dependably be relied on. That is, manufacturers, particularly, would be hesitant to guaranty that persons living beyond a 50-mile span will receive the sight-and-sound presentations at all times.

But now we find that two experimental stations about 90 miles apart have been clashing seriously enough to work out a time-sharing arrangement on their assigned video band. The stations concerned in the agreement are W2XAX, New York, operated by *CBS* and W3XE, Philadelphia, operated by *Philco*. And, in the words of the latter firm, the agreement blasted the currently popular scientific theory that television broadcasting is limited to the horizon, giving rise to a wider scope in television research.

Under the terms agreed upon by William H. Grimditch, *Philco's* vice-president in charge of the firm's engineering labs, and Adrian Murphy, *CBS* executive director of television, the Philadelphia station will be on the air between midnight and noon daily, and on Wednesday, Friday and Sunday evenings after 6 p.m. The New York *CBS* station will confine its transmissions to all other times on the identical channel of 50 to 56 megacycles.

This agreement was apparently an amicable one. But we see some trying time-sharing deals ahead if the collision of television signals becomes a general thing when the new art goes commercial.

NBC's booklet entitled "Television" has reached its second edition. And a nice job it is, too. Distribution of this attractive promotional piece is restricted to persons making the Radio City television tour, which is available to New York City visitors at a nominal price. A foreword by Lenox R. Lohr, *NBC* president, puts forward the statement that, if launched "prematurely," television, would not measure up to American standards of public enjoyment. In view of the tremendous strides in the video art covered in both text and pictures in the booklet itself, it is a bit surprising to read these words from Mr. Lohr. They recall the "Go Slowly" attitude of the past rather than the present public demand for "Full Steam Ahead."

The booklet serves as a sort of libretto to the television tour, giving the tourist a permanent souvenir record of the exhibits and demonstrations he witnesses. Among the television sub-classifications intelligently treated in the brochure are "Programming," "Engineering," and "Economics." Other interesting features are a television coverage map of the metropolitan New York area, question-and-answer pages, and a chronological table of video achievements.

With slight revision, the booklet would make a splendid small volume for general distribution.

TELEVISION made its trade debut in New York as far back as last spring. But it had to wait until the winter for its social debut.

The new industry made its bow before the glamour gals (and their pops and moms) of society at a gala charity event billed as the "Television Ball."

NBC certainly went to town on this effort. And the network rates a double round of applause—the first for attempting the intricate task of transforming the ballroom of the Waldorf-Astoria into a video studio and the second for going to all the trouble to raise funds for the *Goddard Neighborhood Center.*

(*Concluded on page* 61)

"You see I wanted my man to get a good-paying job, with some recreational features . . . Does he have to watch that type of woman work? . . ." "No, Mam . . . But it's a 100 to 1 he will!"

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SERVICEMAN'S CASE HISTORIES

by ALFRED A. GHIRARDI, B.S., E.E.

Author of "The Radio Physics Course," "Modern Radio Servicing"; member Radio Servicemen of America, New York Electrical Society, Institute of Radio Engineers.

De WALD 61

Distortion, Hum ....1) cathode of '41 tube shorted to positive filament of '37 tube socket.

De WALD 506R

Hum, Distortion .....1) replace the filter block to clear up hum
2) connect a 1,000-ohm resistor between the cathode of the 6C6 tube and the chassis to clear up the distortion

De WALD 527 Auto Radio

Production changes ....1) later production of this receiver incorporated several improvement changes in the antenna circuit. Instead of feeding the antenna lead (through a 0.01-mfd. series condenser) to the tap on the antenna coil, it is fed (through the same 0.01-mfd. series condenser) to the **bottom end** of the antenna coil. Instead of connecting the bottom of the antenna coil to the ground (through the 0.05-mfd. AVC return by-pass condenser), this condenser is changed to one of 0.002-mfd. and it is connected between the ground and the tap on the antenna coil. The 150,000-ohm resistor in the AVC return goes to the junction of this new condenser and the tap on the coil

De WALD 547-A

Inoperative, Oscillation, Hum ...1) check all filament socket prongs for intermittent "grounding" of half the filament voltage. This will overload the transformer and cause hum. To remedy, simply bend the prongs so this cannot occur
2) oscillation may usually be cleared up by cleaning the rotor contacts of the condenser wipers and securely soldering them to the chassis

De WALD 617 Auto Radio

Ignition interference .1) although this receiver has been designed to operate without ignition system suppressors, if it is installed in an older model car (or the ignition system is faulty) it may be necessary to install a suppressor in the main H.T. lead. In bad cases, spark-plug suppressors may also be needed. The breaker point and spark-plug gaps should be correct (see Section 5 of this book for correct breaker-point and spark-plug gap values for all makes and models of cars)

De WALD 632 D.C.

Inoperative, Tubes do not light ...1) burnt-out pilot light

De WALD 802

Hum .....1) install by-pass condensers for the '2A5 and '2A6 tubes
Distort on on short-wave band ..1) faulty 0.05-mfd. type '2A7 grid return circuit by-pass condenser. Replace with new unit

DICTOGRAPH 91-134 AC-DC

No signal in Mystic Ear ...1) check motor coil for a "short" or "open" in moulded case of Mystic Ear for the trouble

DODGE (PHILCO) Auto Radio

Insufficient sensitivity when used with rod-type antennas 1) remove shield can on side of receiver to which antenna is connected, and "short" the small choke found in series with the antenna lead. Realign first r-f stage

EARL 21, 22

Inoperative ....1) faulty 4,700-ohm resistor (the large **yellow** carbon resistor). Use a 5,000-5-watt unit for replacement
Inoperative ....1) 2-mfd. filter condenser "shorted"
Reversed plate readings on r-f and first-audio tubes
Inoperative .... 1) "open" detector plate-supply resistor. Replace
(no detector plate voltage)
Will not .....1) "open" by-pass cond. in the neutralize r-f plate circuits
2) "shorted" r-f plate choke
3) faulty neutralizing condenser
4) "open" neutralizing circuit
5) try other tubes
Hum .....1) check pilot light current for "grounding." Reverse either the **yellow** and **orange**, or the **red** and **green** leads in the filter condenser circuit
Tubes blow, (r-f secondary coil burnt out) ...1) antenna variometer shaft "shorting" to chassis
Oscillation, Whistle ....1) detector by-pass condenser "faulty" or "open"
Noisy reception 1) the two screws which fasten the variometer and the insulating bakelite strip to the chassis are loose. Tighten them

EARL 31

Same Case Histories as listed for Earl 21 and Earl 32 receivers

EARL 32

Inoperative (no plate voltage on '27 tube) ....1) "open" large enamel wirewound resistor—either the 5,000-ohm or the 4,000-ohm section. The faulty section can be shunted with a 5-watt resistor of the proper resistance value
Replacing dial assembly .1) when it is necessary to replace the dial assembly for any reason, use a Philco 90 dial assembly, as it is easily obtained. File off the five rivets which hold the dial scale of each unit, and remove the scales. Now fit the Earl scale to the Philco assembly

ECHOPHONE—All Models

Intermittent reception ...1) poor mechanical contact between the wipers and the shaft of the variable condenser gang. Clean all these contacts and make them secure

ECHOPHONE MODEL C

Poor sensitivity, Hum 1) substitute a type '56 tube in place of the type '27 tube
Inoperative, Oscillation ...1) loose or bent socket contacts, causing poor contact at tube prongs
Improving performance of the receiver ...1) replace the '01A tubes with type '26 tubes as follows: Remove one of the 5-volt **brown** filament supply leads and connect it to the center-tap at the **blue** lead (which should be removed). Connect this **blue** lead to the centertap of a 40-ohm resistor which has been connected across the new 2.5-volt filament supply. The current drain of the '26 tubes will cut the voltage of the 2.5-volt winding so it will be correct for them. Also connect a 0.025-mfd. condenser from the plate of the '71A tube to ground

ECHOPHONE S-3, S-4

Low volume ...1) open-circuited 1-megohm resistor connected from B-plus to the screen-grid on the type '24 detector tube. If faulty, an increase in volume will be noticed when the unit is shunted with the fingers. Replace this resistor with a new unit
Loss of sensitivity with volume control at maximum setting 2) replace the r-f coils with litz-wound coils (used on the later type models). Realigning is necessary if this is done
3) replace the porcelain-type 1-megohm control-grid bias resistor located on the resistor panel (which is fastened on the side of the chassis) with a new pigtail-type carbon unit
Noisy reception, Low volume 1) defective tone control condenser. Replace with new unit
2) tuning condenser plates touching at certain positions. Bend these out so that they will not touch
Oscillation, Low volume ....1) if the condenser wiping contacts are all clean and all by-pass condensers check O.K., replace the 0.5-meg. resistor from detector screen-grid to ground. This is the smallest one mounted on the resistor panel. When "open" it increases the detector screen-grid potential by about 20 volts causing oscillation and low volume
Inoperative (burned-out antenna coil) ....1) rewind the primary coil with 250-turns of No. 36 wire. One turn at the antenna end acts as a dead end (for capacity-coupling), i.e., the antenna connection is to be taken from the **second** turn, leaving the outer end of the first turn free
Improving reception .....1) replace the screen-grid voltage resistor with a 200,000-ohm unit
2) replace the 0.1-mfd. screen by-pass condenser, as it often causes trouble due to "opening"

ECHOPHONE S-5

Inoperative ....1) remove the cardboard cover from the coils at the end of the chassis. Move the coils close, keeping them at the 90-degree angle
Acute loss of volume ..1) replace the porcelain-type 1-megohm control-grid bias resistor located on the resistor panel (which is fastened on the side of the chassis) with a new pigtail-type carbon unit

ECHOPHONE 60

Volume control operates erratically 1) check the condition of the filter condensers (located directly under the power transformer)

EDISON C-2

Same Case Histories as those listed for Edison R-1, R-2

EDISON C-4

Same Case Histories as those listed for Edison R-4, R-5

EDISON R-1, R-2

Inoperative, (all resistors and other components check O.K.) ...1) open-circuited 3-mfd., 1,000-volt filter condenser section, connected from one side of the high-voltage secondary to center-tap of '81 tube filament winding
2) "open" plate resistor in '26 circuit
3) "open" bias resistor in '250 tube circuit
Weak reception, No regeneration around 550-kc with regeneration switch in "On" position 1) poor ground connections from 1.5-mfd. plate by-pass condensers located in center part of chassis near volume control coupling shaft. Solder pigtails from their common ground to chassis
2) solder pigtail from rotor of tuning condenser gang to ground on chassis
Intermitten reception (tubes and voltages test O.K.) 3) tighten antenna binding post
4) tighten bolts in gang condenser, being careful not to throw it out of alignment
5) tighten the two screws in single-turn voice coil under the speaker
6) weak or faulty type '26 tubes
7) antenna too short
8) readjust compensating condensers
9) open-circuited grid-suppressors
Poor sensitivity, Low volume, Hum 1) replace type '27 detector tube and type '25 first audio tube with type '56 tubes, using the original 2.5-volt detector filament winding for heating the filaments of both tubes
2) remove the grid leak and condenser in the detector grid circuit, and bias that circuit with a 40,000-ohm, 1-watt resistor. By-pass with a 0.1-mfd. cond.
3) re-bias the first audio tube with a 2,700-ohm resistor in the cathode circuit, by-passing it with a 0.5- to 2.0-mfd. cond.
4) adjust hum controls
Intermittent reception 1) open-circuit in any one of the three 600-ohm grid suppressors
2) short-circuited trimmer condenser on the condenser gang. Test for the above by tuning in a station and with volume control at maximum setting, move the trimmers slightly with an insulated tool and listen for any change in volume. Repeat the same with the suppressors
3) poor internal connection in one of the r-f condenser cases. Pull on leads or push on case to show up the fault
Noisy reception 1) arcing between coil and core of plate transformer
2) arcing in '26 tube plate resistor
Troublesome units ..1) 12,500-ohm series plate resistor; 1,500-ohm c.t. 50 bias resistor; and 25,000-ohm "losser" resistor. The ends of the first two have asbestos washers which absorb moisture and transmit dampness to the

resistors, shortening their life. Replace third resistor with a 10-watt unit whether it checks O.K. or not

EDISON R-4, R-5

Poor tone, Condensers blow, Plate voltages high ....1) open-circuited 10,000-ohm "loss" resistor in power pack. This resistor should be checked frequently, as it is the cause of most trouble in these sets

Hum, Distortion .....1) filament winding of type '45 tube short-circuiting to the filament winding of the type '27 detector tube, depriving the '45s of their biasing voltage, since the center tap of the '27 tube is normally grounded. Repair by shifting the center tap on the type '27 tube from the ground to the type '45 filament winding center tap

Distortion (at low volume on weak stations) ....1) check to see if the thin edge of the speaker cone rubs against the pole or field housing. Remove the speaker head assembly. Carefully sandpaper all fuzzy material away and wipe all dirt and particles out from the voice coil space

Distortion (at low volume on powerful stations) ....1) faulty 10,000-ohm section of volume control. Try substituting a new one

Detector hum adjuster burns out ..1) "short" between primary of power transformer and 2.5-volt filament winding. Hum adjuster may be disconnected from the receiver entirely, replacing the detector with a tube of later design

Low volume ...1) "open" r-f by-pass condensers. Best to replace all three r-f by-pass units with 0.1 to 0.5-mfd. to prevent future trouble with them.

Oscillation, Noise ....1) dirty contact wipers on variable condensers. Solder pigtail leads to the rotor and wiper arm and ground

Oscillation at high-frequency end of dial ..1) first check to see if the receiver is properly neutralized 2) check by-pass condensers (located on top of chassis), especially the 0.1-mfd. unit which connects from the cathodes to the plates of the second and third r-f tubes

Oscillation at low-frequency end of dial ..1) 0.001-mfd. condenser from detector plate to ground "open". It is located under the detector hum adjuster and choke subpanel

First r-f stage will not neutralize properly .1) check 0.1-mfd. condenser from cathode to plate circuit of first r-f tube. If this is O.K., check the other condensers in this container

Poor tone ....1) "open" 10,000-ohm loss resistor (8,000-ohms in the 25-cycle model) which is located in the power pack. Plate voltage rises to around 150 volts (instead of normal 115 v.) and by-pass condensers of top chassis often break down

Shrill sound (starts if room lights are snapped on or off) ...1) check power tubes for matching 2) check plate voltage on power tubes. Possibly it is low 3) check plate current of both tubes. It should be not less than 25 mils

Crackling (volume control setting has little or no effect on it) .....1) fine wires of detector choke partially "grounded" to case. Replace with a 50- to 65-millihenry choke

Weak, choked reproduction (high cathode voltage on '27 first a-f stage) .1) "leaky" 0.16-mfd. 300-volt "hum-balance" condenser connected from plate supply to one end of the 6,000-ohm resistor (the other end of this resistor connects to the cathode of the '27 first a-f tube). This condenser may be disconnected and left out entirely in most cases without any effect on the receiver

EDISON R-6, R-7

Inoperative or weak (plate voltages low or zero; bleeder resistor charred) .1) "leaky" or "shorted" r-f bypass condensers (located in one of the oblong cans at the rear of the chassis. Use 0.25-mfd. good quality tubular condensers for replacement

Inoperative, (very low or no screen voltage in r-f stages) ...1) short-circuited 0.5-mfd. condenser located in r-f filter unit connected between second and third r-f tube screens to ground

Inoperative (R-7 receiver) ...1) "open" primary winding in push-pull input transformer

Weak reception, (low plate voltages on all r-f tubes) 1) short-circuiting of 0.05-mfd. condenser located in the detector filter unit, which is connected from the third r-f tube plate to ground

Intermittent reception, (stations tune in faintly then burst through strong and clear), (no det. tube plate volts) 1) intermittent grounding of detector plate circuit r-f choke to case, causing a short-circuit to ground and the cut-off of the plate supply on the first detector tube

Intermittent reception 1) loose type '27 tube socket contacts. Tighten contacts, or replace socket 2) defective phono switch. Replace 3) defective power switch. Replace 4) tighten all hexagonal nuts on power pack connector panel

Rumbling or drumming sound on low audio frequencies ..1) voice coil striking field coil housing at the bottom of the voice coil passage. Insert thick cardboard washer to give voice coil more travel distance

Oscillation ....1) if all by-pass condensers, condenser rotor wipers etc. have been checked and found O.K., connect a 0.01-mfd. 600-volt condenser from the power-transformer side of the line switch to ground

EDISON-BELL 35

Hum .....1) replace power transformer with one having an electrostatic shield or connect two 0.25-mfd. 600-volt condensers in series across the a-c input, grounding their common connection to the chassis 2) open-circuited grounding lead to electrostatic shield

EMERSON 4-TUBE A.C.-D.C.

Distortion, Low volume ....1) defective condenser connected between the plate and cathode of the type '38 a-f tube. This is usually a short-circuited unit. Replace with a 0.004-mfd.

EMERSON A-8

Distortion ....1) faulty 7-section condenser block 2) "leaky" 0.1-mfd. audio coupling condenser

EMERSON AC-7

Oscillation, Weak reception ....1) drop in value of 12,500-ohm, 2-watt resistor. Replace with a 10-watt wire-wound unit 2) leaky screen-grid by-pass condenser

Hum .....1) if filter is O.K. and other common causes of hum are not present, check for a partial short-circuit in high-voltage winding of power transformer. This throws the center-tap off

EMERSON AC-149, AC-168

Same Case Histories as those listed for Emerson U-5A Chassis

EMERSON AD-108, AD-110, AD-125

Distortion .....1) diodes of 6Q7 tube unbalanced

EMERSON Motor-Generator or Dynamotor B-Eliminators

Low volume in receiver 1) this trouble in receivers employing Emerson motor-generator or dynamotor B-eliminators for power supply generally due to failure to oil bearings of the generator. This causes reduced speed and hence lowered voltage output. Put a few drops of light oil in each bearing

EMERSON B-131

Inoperative ...1) "open" 230-ohm resistor in B-return. This is the bias resistor for the output tube and burns out due to a shorted terminal in second i-f coil. Repair this before replacing the resistor

Hum at resonance .....1) poor ground being used with receiver. If possible, make a good ground connection to a cold-water pipe

EMERSON C-5 Chassis

Inoperative ...1) "open" oscillator coil

EMERSON D

No AVC action 1) fidelity switch "shorts" to grid of "magic eye" tube, leaving AVC action open

Distortion ....1) faulty 6F6 tube

EMERSON D-85 (Chassis)

Intermittent reception, Noisy, Fading accompanied by rasping noises 1) poor contact within the dual volume control. The section used in the a-f circuit of the reflexed '6B7 tube usually causes the trouble 2) if reception suddenly cuts off entirely, check the 0.05- and 0.02-mfd. audio coupling condensers for "opens"

Distorted reproduction (with abnormally high control-grid bias on '47 tube) 1) open-circuited 250,000-ohm carbon resistor (one of the two resistors connected in series across the field coil

Distortion (with low grid-bias voltage on '47 tube and grids of '47 tube glowing red) ....1) leaky 0.5-mfd. grid filter condenser in the grid circuit of the output stage

EMERSON E-5 Chassis

Inoperative ....1) "open" 100-ohm resistor in B+ circuit

EMERSON H-5

Hum .....1) check tubes and condensers 2) if tubes and condensers check O.K. examine the line-ballast. If it is the type in which the resistance element is clamped in a metal holder with asbestos as an insulator between the two, put the set in operation and check for leakage from any tap on the ballast to chassis. The asbestos often absorbs moisture, causing leakage. If leakage exists, insulate the ballast from the chassis—or replace it

EMERSON K-116, K-121, K-123

Tuning condensers do not rotate when tuning knob is turned ...1) remove chassis from cabinet. Inspect the tuning belt. If it is O.K., slip the spring off the bracket. Bend spring carefully with pliers so that when replaced it pushes pulley more firmly against belt

EMERSON L Chassis

Inoperative ...1) "open" oscillator coil

EMERSON L-A

Same Case Histories as those listed for Emerson V-4

EMERSON L-AC-5

Oscillation (tubes and voltages test O.K.) ....1) replace condenser C-7 with a 0.0005-mfd. or higher unit

EMERSON L-143

Intermittent short-wave reception ...1) poorly-soldered connections on the short-wave coils. Resolder all the connections on these coils securely

EMERSON M-AC-7

Same Case History as that listed for Emerson AC-7 receiver

EMERSON "MICKEY MOUSE"

Hum .....1) connect a high-capacity condenser between one side of the line and the chassis. Change the position of the 0.0001-mfd. coupling condenser, placing it where the hum is least audible while the receiver is in operation

EMERSON Q-157

Oscillation ....1) add a 0.1-mfd. condenser from electrolytic condenser to ground

EMERSON R-152, R-153, R-156, R-158

Weak reception 1) "shorted" primary in antenna coil

Distortion .....1) "open" 10-megohm resistor (R-8 on circuit diagram) 2) "open" 5-megohm resistor in grid circuit of '75 tube (R-5 in circuit diagram) 3) faulty audio coupling condenser

Noisy reception 1) faulty oscillator coil

EMERSON T, TS

Noisy tuning ..1) bend up the contact springs on the rotor of the tuning condenser, or attach a pigtail lead from the rotor to the chassis

Intermittent reception, Distortion 1) if plate currents of '24 detector and '47 audio tubes are far off from correct values, check the 0.01-mfd. grid-to-plate coupling condenser for leakage

Oscillation on both long and short-wave bands 1) bend the red wire (located between the speaker and the tuning condensers) toward the speaker

Insufficient sensitivity 1) bend this same red wire toward the tuning condensers

No oscillation on short waves .1) increase feedback by connecting a lead to the control-grid of the '24 tube and bending it in place near, or around, the coil mounted on back of the '24 tube shield. Adjust its position until oscillation occurs uniformly over the dial

EMERSON U-4B Chassis

Weak reception .....1) faulty filter condenser. Replace block 2) "shorted" primary of antenna coil. The resistance of this coil should be 10 to 15 ohms 3) "open" or "shorted" primary of r-f coil

Distortion ....1) in early models 0.5-megohm resistor in screen circuit of 6C6 tube increases to as much as 2.0 megs. after use. Replace it

EMERSON U-5A Chassis

Weak reception, Distortion 1) faulty 8-16 mfd. electrolytic condensers

Hum .....1) 20- or 40-ohm pilot light resistor lugs "shorted" to volume control lugs

Distortion ....1) increased value (carbonized) plate resistor

Hum when volume control is increased ....1) separate the connections of the two diode plates. Use one diode for detection. Connect the other to the cathode

Noisy reception 1) faulty oscillator coil

Code interfer. ..1) "open" wave trap

EMERSON U-6A Chassis

Poor tone, Hum, Distortion ....1) replace filter condenser block 2) replace coupling condenser

EMERSON U-6B Chassis

Hum, Poor tone .....1) replace filter condenser block

EMERSON U-6D Chassis

Inoperative ...1) heat generated in filament

voltage-dropping resistor frequently causes loose connections at terminals of unit. Wind the leads securely on terminals—resolder

2) "open" 0.01-mfd. tubular condenser connected between grid of '75 tube and "low" end of i-f winding feeding diode plates of same tube

Weak reception 1) faulty filter condenser. Replace entire block

Receiver drifts off frequency, (trouble appears only when set is in cabinet) 1) overheating of midget-type compensating condenser in series with broadcast oscillator coil. Drill 5/8" hole in cabinet near condenser to ventilate it

EMERSON V-4

Insensitive, Low volume on low frequencies (tubes and voltages test O.K.) ...1) faulty antenna pickup coil. Move coil either up or down over secondary of first tuned r-f stage until the most satisfactory result is obtained, then cement the coil in that position

2) antenna and interstage circuits out of alignment

EMERSON 3C

Inoperative, Weak reception ...1) no screen voltage. Replace 0.02-mfd. screen by-pass condenser and 9000-ohm section of voltage-divider that is usually ruined when this condenser "shorts"

EMERSON 5A Auto Radio

Weak reception, Insensitive between local stations, 1) replace the 14,000-ohm cathode bias resistor for the '85 tube if it has greatly changed in value

Local stations tune in and out suddenly 2) replace 10-mfd. low-voltage condenser in same circuit

EMERSON 20A, 25A

Loud crackling noise after being in operation about an hour 1) intermittent short-circuit to chassis caused by a large lump of solder on one of the filter-choke lugs. The heat developed in the set after it is in operation for some time causes the fibre terminal strip on which the lug is mounted to bend toward the chassis, causing the intermittent short-circuit

2) defective 4-mfd. filter condensers. Replace with new units

Oscillation ....1) remove the antenna wire coil from inside the case. Trouble will be caused by even a small amount within the chassis

EMERSON 26

Partial or intermittent distortion, 1) faulty 15,000-ohm, 1/4-watt screen voltage-dropping resistor for '57 second detector tube. Replace with a 1-watt unit

Whistling, Overloading on strong signals 2) second-detector plate resistor has greatly increased in value. Replace

Weak, distortion 1) replace 250,000-ohm resistor between the plate of the '57 tube and the screen of the '47 tube. (Try replacing this resistor even if it tests O.K.)

EMERSON 30AW

Motorboating (intermittent) ..1) replace the 0.01-mfd. coupling condenser on grid of 43 tube

2) change the 1/4-meg. grid resistor to one of 100,000 ohms

EMERSON 32

Inoperative, Hum ...1) "open" in the condenser block beneath the chassis. Shunt an 8-mfd. condenser across the terminals

EMERSON 33 AW

Motorboating (intermittent) ..1) replace the 0.01-mfd. coupling condenser on grid of 43 tube

2) change the 1/4-meg. grid resistor to one of 100,000 ohms

EMERSON 34C

Distortion ....1) "leaky" 0.000025-mfd. by-pass condenser in diode circuit

2) faulty audio coupling condenser

3) faulty bias cell (should measure 30 to 40 thousand ohms)

4) "open" 250,000-ohm volume control

EMERSON 36

No screen voltage ....1) 0.02-mfd. screen by-pass condenser "shorted" or "leaky." Replace with a 600-v. condenser. Since a "short" in this condenser usually causes the 9,000-ohm section of the voltage divider to burn, it is advisable to check this resistor also. If necessary, replace the divider with two separate resistors—one a 9,000-ohm 2-watt unit, and the other a 27,000-ohm 1-watt resistor

EMERSON 38

Same Case Histories as those listed for Emerson U-6D chassis

EMERSON 39

Same Case Histories as those listed for Emerson D-85 chassis

EMERSON 42, 49

Same Case Histories as those listed for Emerson U-6D chassis

EMERSON 59

Same Case Histories as those listed for Emerson D-85 chassis

EMERSON 101, 102, 102E

Inoperative, '80 tube blown or red hot ...1) filter condenser "shorted." Replace the entire filter block, using two 10-mfd. 600-v. units

Inoperative (model 102 AC-DC receivers). Chassis smoking ...1) 25A6 power amplifier tube faulty

Weak reception, Weak and distorted reception 1) for these troubles in the 102 receiver see the Case Histories listed for the Emerson 104 receiver

Hum .....1) filter condenser capacity below normal. Replace the filter block, using two 10-mfd. 600-v. units

Intermittent reception ...1) check the 0.25-mfd. condenser by-passing the '75 tube plate circuit—connected with a **red** wire on the "high" side

EMERSON 104

Weak reception 1) check the phono-pickup tip-jack to see if the "shorting" member has shifted out of position

Weak, Distorted .....1) leaky 0.01-mfd. coupling condenser between the plate of the '75 tube and the grid of one of the '6F6 tubes. This condenser is part of a block located on the side wall of the chassis

2) if foregoing condenser is O.K., check loudspeaker for a grounded and partially shorted voice coil

Intermittent reception ...1) check the 0.25-mfd. condenser by-passing the '75 tube plate circuit—connected with a **red** wire on the "high" side

EMERSON 107

Inoperative ...1) "shorted" electrolytic condenser

Intermittent operation, ...1) "leaky" 4-mfd. 150-v. electrolytic condenser across speaker field

Distortion 2) loose wire on coils

3) faulty condenser at cathode of 25Z5 (blue lead going into small condenser block can). Replace with an 8-mfd. 175-v. unit

EMERSON 107W

Distortion .....1) the resistance from the grid of the '43 tube to ground should be approximately 1 megohm. A lower reading indicates breakdown in the 0.1-mfd. condenser

EMERSON 108, 110, (Chassis U5A)

Hum .....1) if filter condensers, rectifier tube, etc., check O.K., look for a "ground" between the pilot light resistor and the chassis. Replace with a 25-ohm, 10-watt wire-wound resistor well insulated from the chassis

EMERSON 106

See also the Case Histories listed for Emerson U-6A Chassis

Weak reception, Poor tone 1) replace filter condenser block

Distortion .....1) partially "shorted" condenser in grid circuit of 43 tube

EMERSON 250

Intermittent reception ...1) check the dry electrolytic filter condensers. There are two condensers in a single case (the one on top when the chassis is upside down) having values of 8 and 16 mfd. Use a factory replacement to fit into the small space available

2) if the foregoing condensers break down, the 25Z5 tube is likely to be damaged and should be replaced

Weak reception 1) check the voltage on the speaker field. Low or no voltage is likely due to a faulty section in the 25Z5 rectifier or filter condenser which shunts the speaker field. To get at this condenser, the receiver filter condenser must be unscreened and pulled out

Distortion .....1) try another 43 power tube. As the circuit is critical in this respect an especially good tube must be used here or distortion will appear at irregular intervals

Hum .....1) filament resistor (mounted on the chassis) "shorting" against metal container. Replace the resistor, or insulate it from the metal

EMERSON 250AW, 321AW, 350AW

Motorboating (intermittent) ..1) replace the 0.01-mfd. coupling condenser on grid of 43 tube

2) change the 1/4-meg. grid resistor to one of 100,000 ohms

EMERSON 415, 416

Same Case Histories as those listed for Emerson V-4

ERLA, BRANDES

Intermittent reception ...1) faulty local-distance switch. Contact material becomes loose in the spring. Put the contact piece back in the tapered hole, and carefully centerpunch around the edge to tighten it in place

ERLA-SENTINEL 60BT

Volume low (all voltages check O.K.) ...1) partial "short" in volume control. Center terminal tests about 500-ohms leakage to ground. Replace the unit—even if it tests apparently O.K.

ERLA 224 A-C

Intermittent reception ...1) faulty local-distance switch. To repair, put the contact in a tapered hole and centerpunch around the edge to retighten. As this is a single-pole double-throw switch, it may easily be replaced by any similar type having the mechanical requirements to fit the receiver mounting

High plate current in '45 tubes ....1) check the two resistors connected in series across the speaker field. The one which connects, at one end, to the centertap of the high voltage winding should have a value of 6,000 ohms. The one with the 0.5-mfd. condenser across it and which has one end grounded should have a value of 10,000 ohms

Hum .....1) remove speaker plug and check the resistance across the two right-hand terminals on the terminal strip of the receiver. If a low resistance (or a "short") is indicated, the 1-mfd. section in the condenser block is probably "shorted." Test it (this section is connected between the high-voltage center-tap on the power transformer and the "high" side of the speaker field). Two other filter condensers, of 2- and 3-mfd. respectively, have their common negative connected to the "high" side of the foregoing condenser. Lift the terminal strip on the old block; remove the leads to the three condensers, and connect new condensers externally in their place

Severe hum modulation and distortion (accompanied by no grid bias, high plate current, and low plate voltage on the '45 tubes, and little or no speaker field excitation

EVEREADY 1, 2, 3

Inoperative, Weak (no plate voltage on r-f tubes) ...1) large Pyrohm resistor in B- lead of r-f tubes "open"

Intermittent reception ...1) loose lug on front of first condenser stator section

2) variometer connection lead short-circuiting to chassis

Weak reception, Distortion 1) open-circuited 50,000-ohm detector plate supply resistor

Noisy reception 1) noisy 50,000-ohm detector plate supply resistor

2) noisy primary winding of a-f transformer

Motorboating, Oscillation .1) connect additional 1-mfd. by-pass condensers from either side of detector plate supply resistor to chassis

Hum at resonance .....1) supply line by-pass condenser open-circuited

EVEREADY 30, 40

Intermittent reception ...1) intermittently open-circuiting winding on speaker voice coil, opening with the vibration of the speaker. Rewind or replace the voice coil

Oscillation at high volume level ..1) check line voltage. Should not be over 110 volts

2) if line voltage is O.K., adjust variometer on end of condenser gang shaft for no oscillation by loosening mounting screws and turning its stator

EVEREADY 42, 43, 44

Weak reception, Distortion 1) "open" 1,750-ohm cathode bias resistor for '27 first-audio tube. Use 1-watt replacement unit

No control of volume ..1) "open" 3,500-ohm resistor which bleeds current through volume control from point where r-f tubes obtain plate voltage. Use 10-watt replacement unit

FADA K-35, REV. K-35B

Slipping dial drive ..1) careful examination will show bracket casting holding friction drive to be warped; this will prevent the friction drive from gripping the large drum. (The only solution is to replace bracket casting marked 872MP)

Noisy reception 1) first a-f transformer "noisy" (replace)

Excessive hum 1) either "shorted" or badly leaking 0.15-mfd. condenser in power unit connected across speaker field

FADA KA-41, KA-42, KA-44, KA-47

Distorted reception ..1) "shorted" or leaky No. 5 section in filter block (two blue leads)

BEGINNER'S RECEIVER

by RICHARD D. JONES
Johnstown, Pa.

Most beginners will enjoy building this excellent but simple receiver. It will bring in the distant stations loud and clear.

THIS receiver is ideal for the beginner or DX fan who wants an "easy-to-build" set. Its extraordinary performance, its ease of building and its low cost make it a good set for the ham beginner or short wave listener. It is used mainly as a c. w. and DX receiver, in which it gives excellent service.

The construction of the set is extremely simple. A person having little experience in wiring may build this set with sure expectations of having it work the first crack. It is very stable and has much of the selectivity and sensitivity of a trf. circuit without using two plug-in coils, ganged condensers and without the shielding problems usually encountered with that type of set.

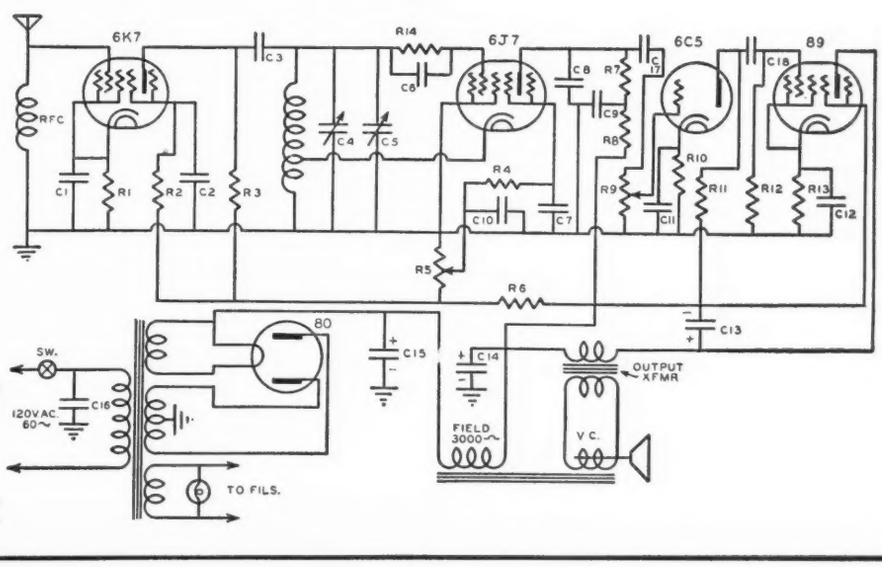
Electrically, the circuit consists of a 6K7 in an untuned r.f. stage, a 6J7 as a capacity-coupled detector, employing cathode regeneration, a 6C5 as a resistance-coupled audio amplifier and an 89 pentode as output.

The receiver is built on a 7"x9"x2" steel "black crackle finish" chassis and a panel 7"x10" made of the same material. The holes are drilled and the sockets and other parts mounted carefully.. All leads are as short as possible. By-pass condensers are located at the point to be by-passed. The heater and pilot light leads are twisted and placed against the chassis to prevent a.c. hum. The only shielding necessary is a grid cap shield on the 6K7.

The power supply is built on the same chassis and is isolated in the right hand corner to prevent hum. Any power supply furnishing about 250 volts at 55 ma. may be used, while the speaker is a dynamic having a field of 3000 ohms and an output transformer for a single pentode output tube. The good old junk box furnished some of the parts. The power transformer was an old *Zenith* transformer which was purchased third hand for the sum of five cents (it having survived the flood of 1936). The speaker is an old *Majestic*, which together with the 89 tube was rescued from the junk pile. If the builder so desires, he may

(*Build further on page* 59)

C_1—.01 mfd. 400 v. paper C-D.
C_2—.01 mfd. 400 v. paper C-D.
C_3—.0001 fixed mica C-D.
C_4—100 mmfd. air dielectric variable Bud.
C_5—15 mmfd. air dielectric variable Bud.
C_6—.0001 fixed mica C-D.
C_7—.01 mfd. 400 v. paper C-D.
C_8—.0001 fixed mica C-D.
C_9—.5 mfd. 400 v. paper C-D.
C_{10}—.1 mfd. 400 v. paper C-D.
C_{11}—.5 mfd. 400 v. paper C-D.
C_{12}—10 mfd. 25 v. paper C-D.
C_{13}—.005 mfd. 600 v. paper C-D.
C_{14}, C_{15}—8 mfd. dual electro. 450 v. C-D.
C_{16}—.1 mfd. 400 v. paper C-D.
C_{17}—.01 400 v. paper C-D.
C_{18}—.03 400 v. paper C-D.
R_1—300 ohms ½ w. IRC.
R_2—100,000 ohms ½ w. IRC.
R_3—100,000 ohms 1 w. IRC.
R_4—100,000 ohms ½ w. IRC.
R_5—50,000 ohm pot. Yaxley.
R_6—20,000 ohms 10 w. IRC.
R_7—100,000 ohms ½ w. IRC.
R_8—20,000 ohms ½ w. IRC.
R_9—500,000 ohms pot. Yaxley.
R_{10}—1500 ohms ½ w. IRC.
R_{11}—50,000 ohms 2 w. IRC.
R_{12}—300,000 ohms 1 w. IRC.
R_{13}—1000 ohms 2 w. IRC.
R_{14}—2 meg. 1 w. IRC.
P.T.—Any power transformer with these windings: 110 v. pri.; 680 v. ct. at 55 M.A.; 6.3 v. at 15 A.; 5 v. at 2 A. Kenyon—UTC—Thordarson, etc.
R.F.C.—2.5 m.h. Bud.
1—7" x 9" x 2" chassis Bud.
1—7x10 panel Bud.
Speaker: Any Dynamic speaker with 3000 ohm field and output transformer for a single pentode output tube.



MANUFACTURER'S LITERATURE

The new *THORDARSON Replacement Transformer Encyclopedia* and Service Guide No. 352-E is just off the press. Published by *THORARDSON*, the originator of replacement transformer encyclopedias, it lists the proper replacement for the power transformer, first filter choke, second filter choke, first audio transformer, second audio transformer and output transformer in thousands of radio receivers. Included is the Service Guide covering timely technical and sales subjects for better servicing. This book is being distributed free by leading Parts Distributors, or can be obtained by writing direct to the *THORDARSON ELECTRIC MANUFACTURING COMPANY*, 500 West Huron Street, Chicago, Ill. (RADIO NEWS No. 3-102.)

Ideas for Profitable Servicing, a new 8-page bulletin issued by Weston Electrical Instrument Corporation, Newark, N. J., presents a new approach to the radio serviceman's problems. Instead of the customary method of describing advantages of the manufacturer's products, the bulletin has the primary objective of offering helpful hints to the serviceman.

These "increase profit" ideas are outlined in separate sections, each bearing on fundamental aspects of successful servicing. The first section, titled "Organize Your Tube and Battery Selling Efforts," suggests specific opportunities for the serviceman to benefit from efficient sales tactics. Next, in the section, "Organize Your Service Procedure," trouble-shooting is analyzed to find ways to locate trouble quickly and cut service time. "Create Customer-Confidence in Your Ability" is an appeal to servicemen to sell themselves and their professional standing by every legitimate means at their command.

The final section, "Cut Overhead," has to do with equipment obsolescence and the importance of investing in fundamental test equipment. Accompanying the text throughout the bulletin are illustrations of instruments which help in the successful application of each idea. Specifications, ranges and prices are listed for these instruments, including the Weston Model 777 Tube and Battery Checker; Model 669 Vacuum Tube Voltmeter; Model 776 Oscillator; Model 774 Checkmaster; Model 778 Serviset; Model 772, Type 2 Analyzer; and Model 766 Televerter. Copies of this bulletin may be obtained by addressing Weston Electrical Instrument Corporation, Newark, N. J., or (RADIO NEWS No. 3-101.)

The P. R. Mallory & Co., Inc., have issued the first three new supplement sheets for addition to the famous Mallory-Yaxley Encyclopedia. The MYE Supplemental sheets are available to everyone in connection with a subscription to the 3rd addition to the Encyclopedia. They may also be purchased separately. P. R. Mallory & Co. have made a sizable investment in order to render this service to its customers. All radio engineers, servicemen, amateurs, and experimenters will find the material to be right up-to-date and in very complete form. Supplement number one covers "Receiving tube characteristics," the second covers "dry electrolytic capacitors," while the third bears the title, "Useful servicing information." Prices and further information may be had by writing to the P. R. Mallory & Co., Indianapolis, Indiana. (No. 3-106).

Sears, Roebuck and Co., Chicago, have just released their new 1940 Radio Amateur, Test Equipment, and Sound systems catalog to the trade. One of the oldest radio suppliers in the industry, this concern lists all of the most popular equipment in a wide range. The amateur gear is right up to the minute in every detail, the sound man will find an assortment of equipment to fill all requirements, while the experimenter will have, at his finger tips, a complete survey on all types of parts and accessories to fill every need. The catalog contains 63 pages of parts, tubes, kits, amplifiers, receivers, etc., and is profusely illustrated in large clear photos. Copies may be obtained by addressing a card to the Sears, Roebuck and Company, Chicago, Ill., or (RADIO NEWS, No. 3-105).

The new issue of the *Meissner Instruction Manual* is dedicated to the Radio Amateur, Serviceman and Experimenter. The subject matter will be found to contain a wide variety of interest to anyone interested in the Radio art from whatever angle.

Complete constructional data is herewith presented on the entire 1939-1940 line of Meissner kit receivers. This information includes the detailed Pictorial Wiring Diagram, in addition to the regular Schematic Circuit Diagram, which makes Meissner kits so easy and simple to construct.

In addition to complete information on receiver kits, there is presented technical data, diagrams and operating instructions on the several ready-wired units which were introduced in the 1939-1940 line. These include such items as the new DeLuxe Signal Shifter, Signal Calibrator, Signal Booster and the MC 28-56 Convertor.

All of the material presented is not new. Some previously published material has been reproduced in order to make the book complete and self-sufficient. Not only, however, have new kits and wired instruments been included, but many pages of entirely new informative material and charts have been added. The treatise on "Television in Theory and Practice" will be found to provide excellent coverage of a comparatively complex subject in a simple and understandable manner. This article, in connection with the constructional information on the Meissner Television Receiver, will provide a practical education on the present stage of the art. Price, 50 cents per copy. Meissner Mfg. Co., Mt. Carmel, Ill. (No. 3-107.)

Par-Metal Products Corpn., Long Island City, N. Y., have issued a new catalog. In presenting this new catalog, it has been their endeavor to make a line of standardized metal equipment to include almost every requirement for the sound industry.

It contains new, distinctive features of design and construction on the various racks and cabinets, to conform with the trend toward the "streamlined" effect in modern equipment.

With the departure from the conventional black finish toward the new slate grey ripple, most of the racks, panels, cabinets, etc., may be obtained in the grey finish as standard. The grey blends perfectly with red, black, or chrome trim, dials, instruments, etc.

To simplify the assembly of various parts, the catalog is divided into two sections as follows:

In the "commercial section" the type "C" racks are drilled with alternate 1¼" and ½" spacings, commercially known as "government" or "W.E." standard. The holes are tapped for 12/24 thread, and the type "C" panels listed in this section are slotted to fit these centers.

In the "amateur section" are listed type "A" panels, which are slotted to fit the "single 1¾" center spacings" or amateur rack drilling. However, all of the racks listed in this section have panel mounting holes drilled on universal centers, for either type "A" or type "C" panels. These holes are tapped for 10/32 thread. (RADIO NEWS No. 3-104.)

Of the utmost practical value to designer, manufacturer or serviceman dealing with motor-starting capacitors is the new *Aerovox Industrial Capacitors Manual* just issued by Aerovox Corporation of New Bedford, Mass. Several pages are devoted to pertinent information on motor-starting capacitors, including diagrams, curves, formulae, specifications, tables and a self-calculating graph of electrical characteristics, followed by an alphabetical listing of standard motor brands and types, with their required capacitors listed by Aerovox Catalog Number, capacity, a.c. voltage, dimensions, construction, illustration and list price. Thus the correct replacement can be selected for any standard capacitor-start motor. Standard oil capacitors as well as electrolytics are listed. The handy Aerovox capacitor selector, whereby the proper capacity

(*Concluded on page* 50)

CUSTOM BUILT

Some time ago our engineers were asked to design and build a good communications receiver. Since price was no object, the buyer demanded certain refinements which he thought were essential to the type of work that he wished to accomplish. After analyzing the matter, and going somewhat into design principles, we came to the conclusion that our prospective buyer's needs would be best served by the purchase of one of several receivers currently being manufactured in "bulk". We wrote him to that effect. He replied that he wanted a "custom built" unit.

He had the wrong idea. "Custom built" has apparently come to cover a multitude of meanings . . . from individual testing of a manufactured unit to hand-winding of transformers. These interpretations are not, however, the way that *we* see it.

To us, a "custom built" unit is one which is *designed from scratch* to fill a specialized need. To us, "custom building" means that we must understand the use to which the unit is to be put, the training of the individual who will use the unit, and the work the unit must perform. Only by thoroughly understanding these factors, do we believe that we can *create* a real "custom built" unit.

For those jobbers, dealers, manufacturers, readers, or radio men who have use for just such a service, we offer a reliable firm to back our word that we *can* do the job, and at a reasonable price. Our "custom built" units are really custom built.

We are prepared to quote prices on: The RADIO NEWS High-Fidelity Radio Tuner, The RADIO NEWS Full-Range Amplifier, The RADIO NEWS Dialomatic Mobile Transmitter, The RADIO NEWS Private Flyer's Special Transmitter, The RADIO NEWS 5-10 Meter Transmitter, The RADIO NEWS 5-Band Portable Station, and numerous other units, receivers, transmitters and amplifiers designed by or for the staff of RADIO NEWS in the last two years.

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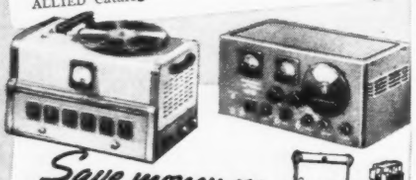

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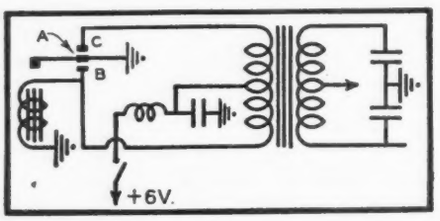
EXCERPTS FROM THE R. T. I. COURSE

Automobile Radio Sets and Installation

Radio receivers for automobiles are now considered standard accessories. Auto sets present a number of special installation problems and must be correctly installed by the radio servicemen. Since the total operating power must be obtained from the automobile's regular 6-volt storage battery, the set must be designed with power economy in view. An average radio will have a current drain from 6 to about 10 amperes. Vacuum tubes of the 6.3 volt series are employed and obtain the filament current directly from the 6-volt battery. The high B voltage and C voltage, if required separately, are obtained by means of a vibrator power supply. The genemotor supplies popular a few years back are not used in late-type radio.



The auto radio set must be extremely sensitive since a very small antenna placed relatively near the ground is used. Essentially the average auto set is a superhet using 6, 7, or 8 tubes and obtaining the B power from a vibrator type unit. Usually a number of special chokes and by-pass condensers are used in the circuit to suppress ignition interference. The turning condenser and volume control are mounted in a metal cabinet housing the complete chassis and the speaker, but these are controlled externally by means of drive shafts and remote control units. In older radios mounted in cars prior to 1935, the remote control unit was placed on the steering column, but present day sets have custom fitting controls placed in spaces provided on the dashboards. There is also need for the servicemen to move the radios when cars are traded in.

In connection with the operation of auto sets' power supplies we must carefully study the action of vibrators. The non-synchronous vibrator consists of an armature which is kept in vibration by an electromagnet on the same principle as the buzzer.

This diagram shows only the vibrator itself with the transformer and r.f. filter. When the switch is closed current will flow through the lower half of the transformer primary and then through the magnet windings. The armature is then attracted and contact A will touch contact B, thereby short circuiting the electromagnet.

(To be continued)

Hamchatter

(Continued from page 36)

is increasing the input to a full KW very shortly. Mick sounds plenty loud with the 600!

ADD to W4ARX's usually excellent colyum the following dope:

W4ERS has moved from Waycross, Ga., to Tallahassee, Florida, and will be active there shortly on all bands.

W4FVJ is new ham on 160 at Tallahasee with several new hams expecting tickets and possible new ham club to be organized.

W4KB plans big hamfest as per usual at Valpariso, Florida. COS is active with Florida net —FOD is back on air at St. Petersburg after moving there from Americus, Ga.

4FJM has FB new rig on 160 with EZV at Panama City once again active.

W4BCO, Bliss City, Tenn., is on 160 and other bands.

Ray W4DVK at Chattanooga, Tenn., who does most of his hamming on one mixty has a new rotable beam receiving antenna that he says is the grapes. Details could probably be had from him.

4ESQ same city also has fine fone rig on air and is very active.

W4CVM at Wetumpka, Ala., has recently rebuilt rig and reports that he still is putting out juice for power co. there.

W4DPX at Montgomery has new 150 watt fone rig and reports that EFD—G1R—GDU—AP —EAY are all active with regular meeting of amateur club there. FB Joe and tnx fer dope.

W4FXN at Dothan is active again and keeps daily sked with brother 4G1R at Montgomery and also is running qsl race.

4FBZ at Evergreen, Ala., is back on air and keeping his part of the state covered with FB rig.

4FNL is on 160 fone at Birmingham.

W4GB Columbia, S. C., has 400 watts on 160 and says that he finally has the bugs out of same. Hi.

4FNC-EJK are active with S. C. net.

W4FWD, Atlanta, announces the birth of a new Jr. OP and of course it was a boy. Phil says that instead of cigars he kept the power co. up wasting juice telling the world abt it. Congrats to you and the XYL Phil.

W4BIN formerly of Albany is on 75 phone in Atlanta.

W4GHU is new ham at Albany, Ga., and has organized new ham club there with ten charter members.

4BIW same city is active on fone and CW.

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NAME:.....

Write address below and send this corner.

Howard Harriss writes us that he reads *RN* every month and will shortly apply for a W4 ticket at Plains, Ga. Tnx, Howard, for words of praise.

4GJR is building new vertical at Monroe.

4BB is active on fone at Brunswick, Ga., with low power.

Doctor Pepper (W4FOL) at Savannah tells us that he is building new five meter rig.

4WZ same city recently put new broadcast 5 kilowatt HI-FI job on air and finds time for some hamming.

W5BEV has new broadcast job at Savannah and will be W4 shortly.

W4ESE another commercial there has FB new fone rig on air.

4FES has 500 watter on 160 and Ten and also is vital member of Sav. radio club.

4DAA also has the five meter bug and is building rig.

4FEC the genial RI in Savannah says that he had FB luck with operations at Savannah fair and suggests that others try it during 1940 season.

Knowles W4GHK same village drops us a card and has new FB rig on 160. Tnx, Knowles, and keep reading this mag Om.

4FDE has new fone rig on air at Cordele.

W3ARX (boy is that call an honor) is operating portable in Georgia. He is inspector for *REA* and is in Americus, Ga., at present.

4FDJ in the beautiful swamps of the Altamaha reports that he had personal visit with 4FFI and 4FCW recently. Ernest is unable to travel and Ga. hams who know and love him orter go to Lyons and see him.

You south Fla. hams still ain't writing in. I believe that there is some writers around Miami that cud waste three cents in an emergency. How about it, gang?

WALTER VOTINEN of W. Orange, N. J., writes in:

With the new rotary beam really doing its stuff, W2JBN has finally gotten the itch to QRO. He is now building a new 200 watt rig for ten meters using T40's. Says Andy, "What's a fellow gonna do when BCL's repeatedly call on the land wire to complain of QRM, and then refuse to give their QTH."

HAM lowdown from the *King of Happiness*, W9KOH: 10 meters has been wide open for short skip, but no DX coming through. 160 meters is in extra good condition for daytime contacts, 5th district rolling in at noon time.

W9APY will be on 160 meters soon with Hy 61's.

W9IFR is rebuilding with T55's nice going Duffy.

W9ECQ a new addition to 160 meters. Welcome, Ray.

W9KOH now using 500 watts with RK 63 final on 10 meters and 160 meters.

W9QUV now using cathode modulation, and also putting up a rock-crushing antenna on 160 meters.

W9ZOF is a new 700 watter in Kansas City on 160 meters.

W8RGV finally went to 10 meters and I hear has a nice sig.

W9NMA is putting a swell rig on 160 real soon.

W9AIF is going great guns on 10 meters, and always puts out a swell sig on 160 meters.

W9ZDR recently moved from Newton, Ia., to Centerville, Ia., that brings him to my neighborhood. Welcome Howard.

W9QQC will be on 10 meters soon with a new Thordarson rig. Henry is active now on 80 and 160 meters.

For the rest of the news listen on 1850 kc to W9KEX and W9CGX any evening about 11 p.m. Hi Glenn & Helen.

I believe the main cause for the increased QRM on 160 meters is that many of the boys are moving down there since the dx is all but gone.

[*Send in some more stuff KOH, we can use it!* Ed.]

W2KOR, fum ole Jamaica, L. I. (Do they have Inns there, too?), shouts:

W2LGI has ylitis.

W2MHE is trying eco since breaking his 40 mtr xtal.

W2LIM is buying phonograph records for his Christmas present to himself.

W2KOR joined the Forty Meter Tfc System.

W2LUN swears by the zepp ant.

W2MJE runs 60 watt into his xtal osc.

W2JRB has moved again, this time to Springfield.

W2KGR goes on 80 once in awhile.

W2MRP is new ham in these parts.

W2LIM won an S11 at the federation hamfest, held in Queens Village, and he brought a friend along who won another one.

W2KIK was seen working at the local radio store.

W2CZX burnt out his class "B" transformer. Do you want to see a radio tower? Go down to W2ERO's in Richmond Hill, and get a gander at the one he has just built!

W2LRC is heard often on 80 meters.

W2LUW runs a pair of T20s in final on 160.

FROM W9AUD:

Adeline, the YL op, is on 40 es looking over the band every day and night.

W. H. MacFARLAND of Los Angeles says:

A television demonstration was given by W6OPM at a local radio store. W6AGG, W6VJ, W6CRL, W6CPY, W6PRZ, W6PDY and several others were present. A few evenings later W6CL took his gang up to see the demonstration and all report F.B.

W6CRL who has been off the air for some

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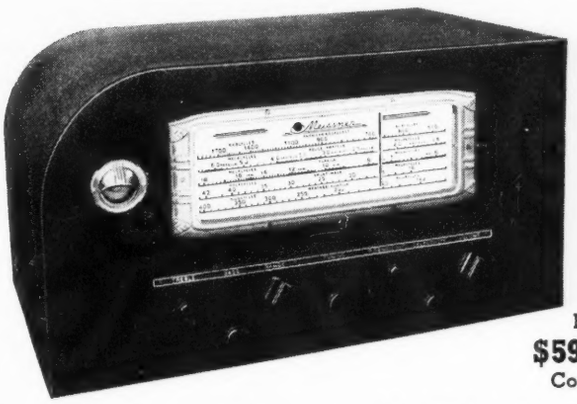

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time is now on 2½ meters with f.b. signal.

The 2½ meter band is sure showing a lot of activity these days.

W6OEF, the ham what am, is on 10 meters now. He is active on all bands and keeps the boys wondering what freq. he will be found on next. F. B. Hall.

W6FDO, the one and only Scotch Wave Station, reports he would go on 10 meters but mon look at the poorer aye wud be losing. Does cost money doesn't it, Scotty?

W6EJZ sold his chickens, I hear. Maybe we'll hear Charlie on the air soon. Hi, hi!

W6PCA has been remodeling his home. Sure look A.B. George.

W6RVL sure going to town on 2½ meters with 200 watts, I hear.

W6ZCN, formerly of Oakland, is now heard on 160 meters in Inglewood.

W6OPF has forsaken the ham ranks to study law. Good luck, Johnnie.

W6AGG is planning on being on the 160 meter band for awhile.

The newly organized Inglewood club reports f.b. attendance and really going to town.

W6CL working on 400 watt 10 meter rig pair 35T in final.

W6PRZ trying his luck on 2½ meters.

W6CPY reports he will be putting up a rotary beam for 10 meters soon, look out East Coast.

W6FDO es W6PDY, the two blooming Scotchmen from the Bell Club, have been seen together a lot lately. And to top it off, both smoking cigars. What's up? But whoa, who bought the cigars?

W6NAT, recently married, has moved into his new Q.T.H. Wish you both luck and happiness.

W6IOA still wonders why the transformer burned out.

W6KTY, by gorsh, give me my c.w. any day.

W6PWF returned from the sticks and now is back on 160 meters.

JACK CASEBEER tells us: W6RZI is christening a new 60-P exmtr, es planning on working 10 meters fone. DX wishes W6HRF is getting on 809 on 40 c.w. es also 160 fone. We are glad to have him back with us agn.

W6OWT is putting a vy fb sig on 40 es 80 using a T55 running abt 168 wtts to be exact. Vy fb.

FROM Bobby Kurth at Lufkin, Texas:

W5GBU (Sol Brown) will be back on the air soon on 160 meters.

W5HYH was pretty sick. Before he was sick he worked c.w. on 40 meters. He is getting a voice adapter for his set.

Thursday night, December 28, I picked up an interesting round-table on my receiver; W5DHE; W5AKZ; W5FUW.

I sent in for my ticket the other day. I plan to work on the ten and five and one hundred and sixty meter bands. I am fourteen years old. [*Well, alright!!!! Dig, dig, dig!* Ed.]

OUACHITA VALLEY AMATEUR RADIO CLUB, Monroe, La., reports:

W5GYR is active on 160 fone.

W5GED and W5CQV have an almost nightly schedule on 160 fone.

W5ADJ also on 160 may be heard with a powerful signal in the wee small hours.

W5EGK who pulls in real DX on 40 meter cw, has been off the air temporarily. He conducts code classes for beginners on Tuesday nights at *Northeast Junior College* of *L.S.U.* in Monroe as part of the service of the *Ouachita Valley Radio Club.*

W5SI is now an honorary member of the *OVARC.* The genial director of the Delta Division of A.R.R.L. made his first visit to the club in December.

W5FJW also assists with the c.w. class, enabling the beginners to become accustomed to more than one fist.

W5BKN in Monroe with Civil Aeronautics Authority for several months, has been transferred to a post in Texas.

W5IPS a new ham, also with *C.A.A.*, is stationed at the weather bureau at Selman Field in Monroe.

W5CNG works cross-band from 75 fone with 160's.

W5HEK received a real grass hula-hula skirt from Honolulu after a qso with a K6. Some QSL! Yuh oughtta see his 10M signasquirta!

W5HEJ not to be outdone by his XYL got a cigarette case woven from native Hawaiian fibre.

W5AKJ when not on 160 spends his time calling K6's on 10 meters.

W5DXL is an operator at the transmitter of KMLB.

W5IPX new ham in West Monroe is now on 160 fone and 40 c.w. He is also an authority on the treatment of blisters.

W5IDK is electrical engineer at *Brown Paper Mill,* said to be the largest manufacturers of kraft paper in the world.

W5AKT works in the *Sterlington* plant of the *Louisiana Power & Light Co.*

ex-W5BDN is busy forming a new anti-aircraft unit of National Guard in Monroe. The outfit will include a complete radio squad equipped with the newest Army approved portable rigs.

W5EB and W5IIH drive sixty miles to attend meetings.

W5HOS used to be in the navy. When he isn't busy on 160 fone he operates a radio repair service.

W5GPE is a student at Louisiana State University.

W5FVD does his studying at Louisiana Tech.

W5IHX is another ham with C.A.A. in Monroe.

W5UY also works in an engineering capacity with Uncle Sam.

Ouachita Valley Amateur Radio Club has 33 members, of whom only 13 are not yet licensed hams. Meetings are held on alternate Thursday evenings at Northeast Junior College. All hams in the Ouachita Valley are invited to attend. No dues are collected.

HERE'S ONE FOR THE BOOK! TOO BAD IT ISN'T *"MERRY" W5DRF!* Alrightalright, go look it up in the Call Book yourself!

WRITING about dx is becoming more of an art every day. It's a great author who can write intelligently about nothing. All is not lost for the boys who haven't worked all continents yet. The two Americas are well represented on the air, K6's and KA's will supply Oceania, EK1AF can fill in Africa, the numerous J's and XU's make lush picking for Asia, while CT1OB, LX1UU, LX1SS, HA5T, HA5U, several Spanish stations, and a few European bootleggers in unnamed territory fill in the sixth continent.

It looks as if long suffering dx men are getting at least one present for the new year. Henry EL2M Grimes, is in the U. S. studying radio engineering. Many of the fellows who worked him did not receive a QSL for one reason or another. If you're one of them and want a card from Liberia drop W2IOP a card with all the data pertaining to your contact and you'll be taken care of. EL2M used a 300 watt self excited transmitter and an *HRO*, a combination that gave many a dx'er a new country.

W4FIX can't say anything encouraging about

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MARCH ISSUE

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dx either. Just a few stray Asians down in Ashville.

K6OJI, who is a dx'er in his own way, sports a QSL card that's a lulu! He was so swamped for the cards by S.W.L.'s that he went into business at 10c per. At any rate, or price, it is somewhat different from the usual run-of-the-mill QSL card.

ZD2H writes that due to the absence of power and the international situation he is QRT. Art is now located at *Buea-Cameroons*, British West Africa. As soon as the ban is lifted in ZD2 he expects to be back on, then look for ZD2H on 14312 KC.

W1HSX has been off 7 and 14MC. since August. Andy now divides his time between ten meter phone and 80 meter c. w. HSX reports little DX on ten; a few K4's, CO's, EA7BB, OQ5AV, LX1UU, OS5D, NY4AD, and several South Americans. Andy says that 80 is still *the* band. Elsewhere ten hasn't been so discouraging. Some of the DX includes: HC2CC; TI2RC; YV5AK; LU7DQ; KA1LZ; KA1ME; J2KN; YN3DG; J3FZ; XU8MC; and LU9BV.

DOUG. WHITE (W9BVB) writes:

W9DXE and W9EZC are "Sky Buddies-ing."

W9BVD is operating portable (Naperville).

W9WZO has recently acquired Class "A" ticket.

The "Naperville Netword" (W9EZC, W9BVB, W9WZO, W9ECF, W9FDA, W9EOT) is planning to go on 2½ meters.

W9UEY's radio service shop takes so much time, he hasn't been on the air for nearly a year.

W9EJZ with 18 watts worked W8 in Michigan on 160 Mtrs. with W9LLM.

"Hank," (W9CAX) has engineered and built many of the Aurora Hams' rigs.

W9EZC is building new rig (6L6-809) for 10-20-40-160 Mtrs.

W9BVB is building 150 W. rig for 10 M fone.

COMMENCING with some issue in the near future we will run a calls heard department listing the calls of stations heard throughout the world on amateur bands *other than 20 meters*. Since it is no trick to work DX on 14MC. such reports would indicate nothing. We all had fond hopes for 40 and 80 this winter so these reports will at least give us some idea of what we're missing. Several dx stations have already agreed to cooperate and just as soon as we can get the lists started we shall try and make it a monthly feature. Lists will be handled by air mail wherever possible to facilitate speed.

W2IJU of Far Rockaway is operating on all bands. His DX for the month is EK1AF on 14070 KC. On 75 phone Marvin has been working the West Coast with excellent reports, which seems to indicate the low frequency bands still have some DX left in them.

EI7L is still sending SS pasteboard. Andy uses his DX log as a mailing list. So far we haven't heard of any of the boys getting rich quick.

W2GT confirms the worst about 20. Eddie received a card from MX1A and J8PG to console him, which is more then most of us can say.

W2JB is still handing out cigars over his contact with VU7BR.

The New England grapevine reports W1KHE knows nothing whatsoever about VU2XX, which all goes to show you just how low the bootleggers are sinking.

QSL's from HB1CE are arriving. KH6RZQ was heard on 6995 KC. and 7020 KC. He claims to be in Samoa, saying that three KH6's got together just to give the boys a new country and when the semi-annual boat arrives they will QSL! Well seeing is believing.

Our South American spy thinks PZ6ZK is a phoney. The Dutch colonial government keeps a 24-hour watch on the amateur bands *just to make sure you don't work Surinam*, so any station operating as long as PZ6ZK did would be rapidly discovered.

G6WY and G2ZQ are in the Royal Air Force.

G6IA, who was in the last World War, is too old for this one.

G6RH hasn't been called yet as he is still chief engineer of a large radio manufacturer.

G5FA is still with the marine insurance company.

A RECENT copy of the *Manila Sunday Tribune* carried an enlightening story about KA1HR. Known as an outstanding traffic station KA1HR's 5,500 Christmas messages handled last year are substantial evidence. The station is operated by the *12th Signal Company (PS)* located at *Fort William McKinley* in *Rizal*, Philippine Islands. Started in 1925 by Lieutenant Hayden Roberts, the personnel now numbers 25 under Major Charles M. Simpson, Jr. Outstanding schedule is their daily contact with W3QP of Blue Bell, Pennsylvania. KA1HR is on regularly from 7 A.M. to 12 P.M. Equipment is a 600 watt phone-c. w. transmitted into a four element rotary beam. Receiver is a *National HRO*.

The newspaper reporter naively told of the exclusive club that the boys belong to because they worked AC4YN. It looks like someone will have to start issuing "Worked AC4" certificates.

W2IOP can't report any dx that would interest a dx man. He has been on 80 for the past month and reports the West Coast as early as 7 P.M. Eastern Standard Time.

The Nassau Communications Association is planning meetings on the air. The first attempt included W2BFJ, W2HO, W2TC, W2MNS, W2MIQ, W2OT, W2FBR, W2MBI, and W2IOP. The schedules are arranged for 20 meters after the band has faded out. With one station act-

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② THE FULL-RANGE AMPLIFIER (Jan. 1940 RADIO NEWS, p. 12) . . . $116.94

Here is a new and radically different type of public address system. The Full-Range Amplifier reproduces music so naturally, so "life-like," that it seems to have three dimensions. Note these features: Individual bass and treble expansion; 15 honest watts undistorted output; outputs of less than 15 watt level retain full brilliance of tone; 11 tubes doing the work of 15; range from about 30 cps to 14,000 cps; perfect voltage regulation. This kit contains every necessary part with instructions for assembly. Most parts already mounted for wiring. Includes tubes, less microphone and speaker. For 115v. AC operation. According to musicians, this is the outstanding amplifier!

③ THE UNI-CONTROL 5-BAND TRANSMITTER (Mar.1940 RADIO NEWS, p. 6) $323.49

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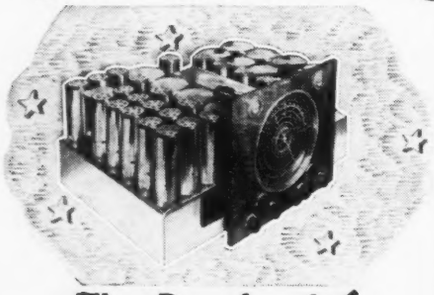

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ing as a control members are hooked up for ten minute contacts with each other. The first round table only worked for a while as the c. w. men couldn't copy the phones and vice versa.

WE were speaking to the secretary of the *Frankford Radio Club* about their unusual amateur organization. W3BXE tells us they have about 25 or 30 members, most of whom are newcomers in amateur radio and very active. Meetings are held every other Tuesday at the *Philadelphia Radio School*. After a short business session the evenings are spent planning the next contest or activity and in personal QSO's. There are no dues of any sort. W3BXE was using an 8 watt E. C. transmitter, one of the new field portables, that should be ample warning to all field day competitors that next year there's going to be some real competition.

Incidentally the *Columbia University Radio Club* gathered itself 229,065.75 points in the 8S. Scores and operators were: W2IOP—101,193.75; W2HHF—70,009; W2KHA—33,080; W2IZO—18,048; W2LIX—5,070; W2AEE—1,665.

AMONG the outstanding 80 meter signals is that of W9OTR, Denver, Colorado. An old 852 running 100 watts puts through an R8 signal on the East Coast from early evening on. Using an *HQ120X* receiver, W9OTR is a pleasant surprise to most everyone who figures he is somewhere in Indiana or Kentucky.

W3GJY is spending all his time handling traffic on 80.

W5HUH/2 is with the signal corps at Fort Monmouth, N. J.

W5OW and W7NH always break through QRM before most stations in their respective districts.

TALKING about old timers, one can't overlook W2LR of Amityville, New York. George has been on regularly with W2LR for over 15 years. In 1924 and 1925 W2LR was a commercial operator for *RCA* and *United Fruit*. Then for four years he was with *WEAF*, finally going to the *Electrical Research Products Company*. He is now a technical consultant in the *Commercial Engineering Department*. As far as activity is concerned W2LR is an *ORS*, emergency coordinator for Suffolk County, and a member of the A1 operators clubs. Active in the *NCR*, he holds the rank of Lieutenant, Junior grade and is recruiting and personnel officer for section six of the third naval district. Except for that he doesn't do any operating other than serve as Net Control station in the N.Y.C.-L.I. network.

THE N.Y.C.-L.I. system is an A.R.R.L. section net which was formed in October 1938. The *AARS* which was then operating on 3710 KC. moved to 3545 KC. and the newly formed New York net took possession of the vacated territory.

W2AZV, local section communications manager appointed W2LR as net control station and W2ITX as alternate.

W2ITX ties the N. Y. net with the AARS on 3545 and 3497 KC. as well as Trunk Line "L" of the ARRL traffic organization. The net meets at 8:30 P.M. daily with attendance running around 12 stations.

Regular members of the New York net are: W2CTN, W2LR, W2DBQ, W2LGK, W2LBI, W2DW, W2LEB, W2BWC, W2IOP, W2GDF, W2MT, W2GIC, W2DOG, W2AZM, W2LPA, W2LID, and W2ITX. Each member of the net is responsible for traffic to certain parts of the country and it is parceled out each evening to the station with the best connections. All of the members are registered with the Emergency Corps and four of them, W2AZM, W2DBQ, W2GDF, and W2LR, are Emergency Coordinators.

W2IOP is Assistant E. C. for Nassau County. On Wednesday evenings special tests are run with all emergency equipment. Members for the net are needed in New York City and the Bronx. The only requirements are weekly attendance and the desire to handle traffic. Inquiries should be sent to W2LR, 78 Washington Avenue, Amityville, L. I., N. Y.

IT is interesting to note that the greatest city in the world, New York, has no emergency coordinator because there isn't anyone willing to take the job.

Miscellaneous-fact-department: An *HRO* in France cost about $450.

W2KMX is off and on the air for an unusual reason. It seems that every time ED has a heavy date he sells part of the transmitter. A blonde is worth a crystal, red-heads an 801 buffer, etc.

We once heard that W8AU and W2BMX sold out together just in order to court one up-state belle.

W1YU, Yale University's Radio Club, is rebuilding.

W9UTB has deserted 40 for 20 meters after working 466 stations in 58 sections on 7 MC. in the SS. Don has a new three element rotary and has added four new countries since December 1. They were a KA, LX, OQ5, and U5. It seems that some friend of his got married and decided he wouldn't need a rotary for a while, so he sold the beam to Don for ten iron men. A tower and rotating device stood 9UTB another $5, so the entire outfit cost $15 net.

W2OT has nearly finished his super-deluxe "poor man's rotary." Within the year we should be able to tell you how it is performing. Twenty has been so foul out at the old timers place that he has QSY'D to 75 phone. He recently voiced his sentiments on a practice that is becoming pretty commonplace these days. That is reserving frequencies for this net and that net. It seems that a W was operating on 80 meters and got hail columbia for sitting on an AARS net frequency somewhere deep inside the band. Using his ECO the fellow shifted down to the other end of the band, only to find he was messing up some other drill. Which all brings us to the monthly peeve that we shouldn't go around reserving 50% of the frequencies on 80 meters. While it is true that they all are doing a fine piece of work there is no reason why a station should be chased from spot to spot while, in most cases, a very routine drill is being conducted. In times of emergency, or under some special circumstances it may be all right, but for everyday operating it is a bit selfish. If a fellow has only one crystal and it happens to be on the XX net they should either supply him with another, take him in the net, or move the net. (Quick Henry shut the door!) Incidentally the station using an ECO should be given due respect because it is possible he doesn't know of the drill.

WSSOI is a weather observer at the Utica, New York, airport. The *Brooklyn Polytechnic Radio Club* auctioned off all equipment not destroyed by fire last year and is planning a new station for 1940.

Alabama's club is composed mainly of amateurs, but is planning newcomer activity after the first.

W2GSA, who rightly won second national high in the W-VE contest, has finally got things straightened out. The Canadian Contest Committee which sponsored the '39 affair expects to have prizes out shortly. The international mixup has caused them some delay.

The FTS net is up to the 200 mark now.

W2TC has a new QTH and is planning a rotary beam just as soon as he can get the necessary pole to support it. It seems that the lawsuit over his other antenna must be dropped for several reasons, mainly the fact he left the area in which the dispute arose.

W1MGF is spending lots of his radio time learning to play the electric organ.

THE BOY SCOUTS OF AMERICA are going to try amateur radio as an integral part of their older boy program. Under the supervision of W2SN and W2IOP a complete troop is being radio equipped as an emergency unit. This unit will be prepared to meet almost any possible emergency situation and will be the testing grounds for similar units throughout the country. At the present time it is planned to use a *Stancor 20P* for the field transmitter, with some small super as a receiver. The progress of the troop is being observed with great interest since its success will mean much insofar as the Boy Scouts boosting ham radio is concerned. The unit is to be equipped soon after January first, at which time activity will commence. Jersey newspapers have given the project considerable publicity as a boon to the state's emergency system.

FOR the record Dept.: *Allied's* of Chi had themselves their own convention. Over 9,500 radiomen attended including 700 hams. Notable hams in attendance were: W1HRX, W9UI, W9TJ, W9MK, W9JU, W9UVC, W9——, W9ETI, and W9FXK. WuzyouthereCharlie? If you wuzn't you missed somepin!

Excerpts from the Ham-Rags
HAMGAB (CHICAGO)
Mag of the HAMFESTERS RADIO CLUB

W9ZCH is now WLTU on the Army net, frequency 3497. . . .

W9JOO reports that he received his dog team, and is just waiting for the snow to fall in order to try them out. He has subscribed to RADIO NEWS, and waiting for Bob to come down and see him and take a sled ride. . . .

Possibly it's a sign of old age but W9SXZ attended a stag show and read QST all of the time that the girls were doing their stuff.

While working portable over the holidays we had the privilege to work W9AAG at Viola, Illinois. Here is a true Ham. All the fellas in that neck of the woods call on him for advice and help when they have bugs. It's nothing for him to crank up his gas buggy in the wee small hours and drive miles to get a fellow amateur on the air.

That worried look on our secretary's face, W9MRQ, is caused by Opal, W9CMV, visiting relatives in Wichita, and he is without his weekly sked with Kansas.

We have heard of many lazy hams, and some that neglect to sign their call at the end of a transmission, but W9TLB and W9EDS have installed a radio nurse between their two homes. It must be the height of something.

The new piece of man-made static at the N9IMV's is a boy and not a girl, as reported in the last issue of HAM-GAB.

Our Director, Matty, W9ZN, is carrying a cane. He reports that he broke a bone in his foot playing Badminton. We knew a fellow once that broke his leg jumping out of a third story window.

The Old Skipper, W9MIL finally installed that much talked of four element ten meter beam on 12-9-39.

Liza Weir was in a recent spelling bee over WLS. Don't ask her how she made out.

The new QTH of the W9YZV's is 4011 So. Maplewood. Seems like Peggy stormed when she found out that her folks had sold their bungalow. She was afraid that Santa would not know where to find her, after she had been a good, good girl all year.

W9AJO smashed his car and the XYL's face in a traffic accident. The new puddle-jumper is an Olds.

W9TDF bought a new pair of tens for his final, and is back on the air.

W9NDW attended his second straight meeting all decked out in a new green ensemble. It was suggested that we get him a red toupe and use him for Christmas decorations. He claims he can now get over the back yard fence on 160 using a Marconi.

W9WHN is now interested in models, and everyone wonders the kind.

W9ENX took a little pre-Christmas trip to Ohio to show those W8's the gold call letters on the back of his car.

W9JID should listen on 160. When he doubles in the osc. and calls CQ 75 most of the 160 boys call him. Must be a case of where the doubler doesn't double.

W9QAX has a pair of new sky hooks, and is looking for W9ZYL so he can renew his Subscription to *QST*.

W9IWZ certainly throws his chest out when he shows that photo proving that he is the paternal equal to Eddie Cantor.

W9HOW and W9HNQ report a five-hour contact on 2½ meters.

W9QOJ has a new 6L6 rig. 6L6-6L6-pp6L6.

W9RBR has a new pair of HY-25's in the final, and that better quality is the result of a condenser mike just installed.

The HAMFESTERS bowling team is composed of the following experts in the art of ball (not bull) throwing: W9SHS, W9SAQ, W9NRI, W9RDD, and Al Zales.

Doug Fortune, W9UVC, refers to cathode modulation as a new wrinkle of grid-bias modulation.

W9OIM is one that acted when he read in HAM-GAB that the Coast Guard was looking for 4,300 men. [*The tip was furnished by RN*, Ed.] He will be on the east coast by the time you read this. Don't forget, OM, to send your forwarding address to the Editor.

W9DAB was inquiring at the last club meeting if there was a HAMFESTER member that sold insurance. Seems that he has an acute case of BCL trouble, and his life has been threatened.

Speaking of BCL trouble W9JII seems to have the most publicized case. He takes self assigned quiet hours so that a neighbor can enjoy his favorite programs, only to find that he also comes in thru the electric stove oven, and over the bed springs. We'll bet that Don is doing some high class head scratching.

Dick Kelly, W9FAQ, is the latest graduate of the code class and Frank Tinkham is setting on needles and pins waiting.

It's a KW at W9TLO on 20 meters, pp 250TL with a pair of T822 as modulators.

W9IMN (I make noise) should make a little noise about being left out of the list of over 100 amateurs that are in the employ of Montgomery Ward.

W9AQP trys to live up to his call with that little spit curl.

W9CBJ, Washfurn is in a Peoria hospital for a general overhaul after that car wreck. The news that W9ZHB was going to send in is still AWOL.

W9ZHR climbed a 40-foot mast in the dark to have a flashlight picture taken, but all that was visible were his feet.

W. J. McGuffage, Ex 9AC, 6737 Cornell, heard a R99 sig on 40, and when the QTH was given found it was right close to home, and decided on a little visit. He asked the op if he had been licensed very long, and was informed that he had not, but was Mac's eyes poppin when, some time later, he read the shield that the new operator wore on his vest. Hi boys!

W9RBR is a fellow that tries to live up to his call. (Radios Biggest Romeo), but those fan letters from that eaves dropping female almost has him down.

The new QTH of W9VTV is 1504 East 66th Place.

Talk about club spirit—W9TUV is the Illinois station on Trunk A. He is rebuilding and W9DXL fills in for him, and then W9MRQ fills for W9DXL. Seems like there are a few C. W. men in the club.

It looks like we will be seeing you all at the *Central Division ARRL Convention* in Indianapolis over next Labor Day.

We have it on good authority that W9MRQ wants a new rig but is too darn lazy to build it!

Faces we miss at meetings:—W9FUE, W9MFL, W9ZRF, W9TUV, W9DXX. How about getting the old habit of coming to meetings, like W9EJ did.

W9WOG has sent for all of his radio equipment, and applied for a W7 call. It looks like he is going to stay out in Portland, Ore.

R. H. G. Mathews ex-W9ZN reports that after the next directors' meeting he hopes to have a ham station on the air again.

W9ZYL tried operating in the DX contest without an antenna, after starting the contest a day late.

The direction indicator didn't direction indicate at W9ZKQ, and Uncle Zeke made a trip up to the roof to replace feeders.

AND that about winds up the HC *for this month. Honest fellers, we didn't think that we'd ever get so that we had so much material sent in. Every mail brings us flocks of news items and more items. We have to let some of them go by the board, but for the most part we try and publish all that we get.* HC *is now the largest exclusively gossip column about hams in the country, if not the world. And all this because you have cooperated as well as you have. We are certainly grateful, since without you there just wouldn't be any* HC *a-all atall. To our many many friends and contributors we say, "Vale" (See your Latin Teacher!) and we hope that as a medium for the honest dissemination of Ham Gossip, that we will always enjoy not only the confidence of the authors who send in the dope, but the readers who have been so generous with their praise. Thanx, gang, a lot!*

Ye Ed.

—30—

SOUND TIPS ABOUT THE SOUND THAT'S TOPS

NO MATTER how well a man looks in the pants and vest, he'll never be well dressed witha sleeveless jacket. Unless the suit is complete it's not very useful.

The same thing goes for commercial sound. The man who uses and recommends a complete line has a big jump on the fellow who doesn't. Because a complete line has the *respect* of a buyer. It tells him that there's reliability behind it. He buys with confidence, secure in the knowledge that any time he wants to add to his original equipment he can do so without difficulty.

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824 Orleans St., Chicago, Ill.
Canadian Sales Office:
414 Bay St., Toronto, Canada
Cable Address: Utaradio, Chicago

Ringing the Bell

(*Continued from page* 31)

you must turn-over this merchandise (sell it) during the month so that you can pay back the bank, but oft times a business carries a permanent loan from the bank of sufficient value to take care of the business obligations each month.

16.—*Capital or Net Worth*—Here we credit all money you pay into the business to get it started. We also credit any profit the business makes over a certain period, or debit the account with any losses the business sustains during the same period.

Now, to start off a set of books, it is necessary to make up a "statement" as to what condition the business is in at the time the bookkeeping goes into effect. This must include (1) *Cash on Hand,* (2) *Bank Balance,* (3) *Accounts Receivable,* (4) *Accounts Payable,* (5) *Merchandise Inventory,* (6) *Equipment Furniture and Fixtures,* (7) *Notes Payable,* and (8) *Capital.* A typical statement of Assets and Liabilities is shown in Fig. 1 and its counterpart should be written on page 1 of your Journal, using your own figures, of course.

Let us study the various items.

"Cash on hand" is the amount you have on hand at the beginning of the business day, March 1st (or the end of the previous day), and corresponds to the "Cash Drawer" a/c balance.

"Bank balance" is the amount you have in the bank *at the same time.*

"Accounts Receivable" is the total of all the accounts people owe the business whether past due, due, or not due until some time in the future (such as installment payments).

"Merchandise Inventory" is the true value of the goods you have in stock (whether paid for or not), taken on the night of Feb. 29th after business was over. Note, please, that "Merchandise Inventory" is always valued at either (1) What you originally paid for it, or (2) What you could now buy it for, *which ever amount is the LESSER!* Remember, you *can't make a profit in your inventory account.* It's just not cricket. For instance, if you

Contest Results

(*Continued from page* 14)

H.M.—Ethel Livingston, 1 Glidden Ave., Lowell, Mass. — "Tel-her-visions Are Real."

H.M.—Walter J. Zalner, Radio Room, Police Headquarters, Binghamton, N. Y. — "Why Girls Live Home."

H.M.—Franklyn Foote, 540 Tremont Ave., Orange, N. J. —

"Football's in the home,
Just for you and me;
Johnny Davis is happy,
It's television, you see;
His wife is disgusted,
Well—Oh! Gee!"

H.M.—Paul Fedelchak, 3rd Balloon Squadron, Ft. Lewis, Washington. — "Picture me on the loose."

Manufacturers' Literature

(*Continued from page* 42)

may be ascertained in the absence of identifying data, together with emergency capacitors for temporary repairs, is also included. Copy of this manual may be had from local jobber or direct from company. (RADIO NEWS No. 3-103.)

INTRODUCING a new service to RADIO NEWS readers. Each month we will print short reviews of the leading manufacturers' literature. Under each review will appear a reference number (for instance, the Sears Catalog number this month is, RADIO NEWS No. 3-105). All you have to do is to fill out the coupon at the end of the page indicating by number the catalogs you wish to receive, and we will do the rest. There is no charge, unless the review says that there is, and then that is charged by the manufacturer, not us. Each coupon is good for the time limit stated thereon, and no guarantee is made by us that the manufacturer will send out catalogs to all who ask for them, though they usually have done so in the past. We merely forward your request to them.

—The Editors.

RADIO NEWS, Catalog Dept.
608 South Dearborn Street, Chicago, Illinois.

Gentlemen:

I have checked the literature I should like to have the manufacturers send me. If I have checked an article for which I must pay, I enclose the money.

....3-101	FREE LIST		3-105
....3-102	3-103	NON-FREE	
	3-104	3-106	3-107

Name.....

Address.....

Occupation.....

Call letters, if any.....This offer expires April 1, 1940

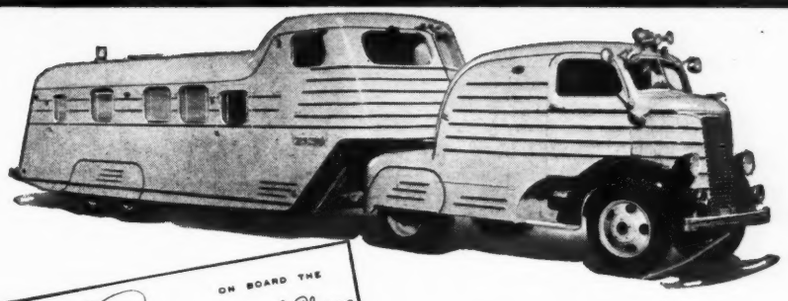
bought a capacitor for $1.00 and its sale price is to be $2.00, it is only worth its replacement value to you, or $1.00. It isn't worth $2.00 until you sell it. Likewise, if you buy it for $1.00 and you subsequently find that you can get an identical replacement for 80c when you take your inventory, *the capacitor is worth only eighty cents!* If the capacitor cost you $1.00 and later its cost price jumps to $1.20, while you have that capacitor in stock, it is still valued at only $1.00. If your tube inventory is $50.00 in July and tube costs are cut so that you can buy them for $45.00, your tube inventory is worth only $45.00. However, if they are advanced in price, to $60.00, they are still only valued at $50.00 until the higher priced replacements are purchased.

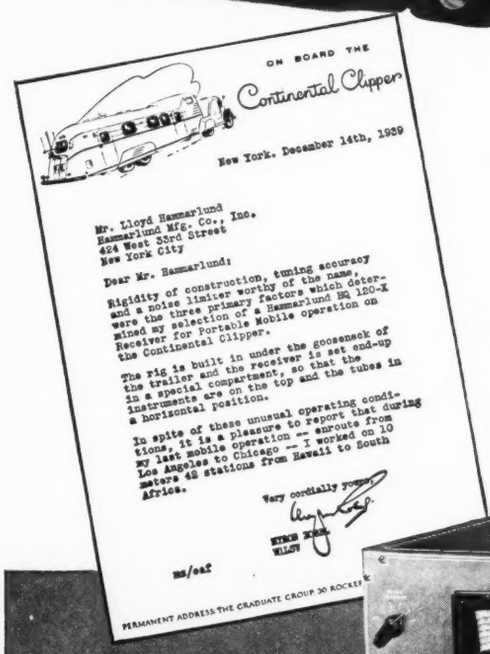
"Equipment, Furniture, and Fixtures" is composed of every item the business owns which is used for the conductance of the business, and is not a part, tube, etc., for sale (in such case it would be "Merchandise Inventory"). Go through your shop from one end to the other and list every thing in this classification. Your list would include your service bench, tools, test equipment, manuals, books, chairs, office furniture, lights, display cases, auto (if owned by the business), etc. Now place opposite each item a valuation which would be equal to its *original* price, or its *replacement* price, whichever is *smaller*. In other words, if you paid $50.00 for a certain test instrument, yet it could be purchased for $10.00 today, it should be listed as worth only $10.00. If, on the other hand, you were able to get something at $20 that normally sold for $30 you should still value it at only $20.00.

Now, on page 2 of your journal, you should head your various columns. There are four columns to the left of the "date" and "account name" columns. The first two should be headed "Cash-Dr-Cr.," as shown in Fig. 2. The second two should be headed "Bank-Dr-Cr" as shown in the same figure. The next column should be headed "1940." The large column is for the account names. Next come "Sundry-Dr-Cr," "A/C Rec.-Dr-Cr," "A/C Pay.-Dr-Cr," "Int. and Dis.-Dr-Cr," and "Personal-Dr-Cr." The balance of the columns are *all* debits and are "Purchases — Radios — Tubes — Parts—Trans." and "Expenses—Labor-Expense." These are shown in Fig. 2 and 3. Note that Fig. 3 is an extension of Fig. 2 and that these extend over a *double* page in your journal.

The various columns are headed so that you can allocate the transactions to the correct columns and so that at the end of the month you need only make *one* ledger posting for each column instead of posting each item separately. The *Sundry* column is used when *no other* column is available, as will be explained later. If you do not sell radios, you can drop the "Radio" column. If you do not employ any labor, you can drop the "Labor" column.

ABOARD the "Continental Clipper!"




ON BOARD THE
Continental Clipper
New York, December 14th, 1939
Mr. Lloyd Hammarlund
Hammarlund Mfg. Co., Inc.
424 West 33rd Street
New York City
Dear Mr. Hammarlund:
Rigidity of construction, tuning accuracy and a noise limiter worthy of the name were the three primary factors which determined my selection of a Hammarlund HQ 120-X Receiver for Portable Mobile operation on the Continental Clipper.
The rig is built in under the gooseneck of the trailer and the receiver is set end-up in a special compartment, so that the instruments are on the top and the tubes in a horizontal position.
In spite of these unusual operating conditions, it is a pleasure to report that during my last mobile operation -- enroute from Los Angeles to Chicago -- I worked on 10 meters 42 stations from Hawaii to South Africa.
Very cordially yours,
ms/eaf
PERMANENT ADDRESS: THE GRADUATE GROUP 30 ROCKEFELLER

IN selecting the "HQ-120-X" for use on the "Continental Clipper," Mr. Zobel, W1LSV, knew he was getting quality merchandise backed by years of engineering in the communications field. The "HQ-120-X" in this case, as in many others, has proved its superiority with outstanding performance under adverse conditions. The low noise level and high sensitivity of the "HQ-120-X," together with a very effective noise limiter, made this excellent 10-meter DX possible. Make particular note how many stations you contact who are using Hammarlund "HQ-120-X" receivers. This great popularity is proof of its effectiveness.

Send for "HQ" booklet 42

the HQ-120-X

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The first issues, already published, contain: combined Tube Characteristics with complete tube charts . . . complete engineering data on Dry Electrolytic Capacitors . . . useful Servicing Information . . . new receiver listings covering all sets from June to December 1939.

A few sets of these first 4 issues in attractive leatherette, 3-ring binders are still available. Eight equally valuable issues; one a month right through the year are still to come.

How to get it: Obtain the complete service by sending in your check or money order for $1.50 direct to us. Or . . . you can save 50c by having your Mallory-Yaxley dealer order the service for you.

You can't afford to be without this Mallory monthly technical service.

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Use YAXLEY APPROVED RADIO PRECISION PRODUCTS

Now make your first entry of $154.25 Cash on hand and $249.27 Bank Balance (using your own figures). Fig. 1 shows this, with "XX" representing the actual sums. Note that the total of these two sums is placed in the *Sundry-Cr* column.

Now, turn to page 100 in your Journal and call this your "Sales Journal." This is merely *a section* of your regular daily journal which is used to record *Sales exclusively.* See Fig. 3 for proper set-up. When you finish setting up this, lay our Journal to one side and take up your *ledger.*

You will note that there is a package of blank pages and a package of lettered pages (A, B, C, etc.). The binder locks and unlocks with a key and the pages are inserted by dropping them down over the posts. Set up the book by placing about 10 blank sheets, then the "A" page, 3 blank sheets, then the "B" page, 3 blank sheets, then the "C" page, etc., through the alphabet. Place any remaining sheets at the front of the book and lock on the cover.

Each page shows "Sheet Number," "Rating," etc., as well as name and address. Title each sheet *before* the "A" page and post the correct amount thereto if shown on the "Assets and Liabilities" Statement. Fig. 4 shows how one of these is done. The balance are shown as "T" accounts in Fig. 5.

Now head one page for each of your customers who owe you money. Place these entries on the *Debit* side. Use the pages separated by the "A," "B," etc., title pages, that is, all customers with names starting with "A" should have their accounts listed after the "A" page, all customers with names beginning with "B" should have their accounts listed after the "B" page, etc.

Title a page for each firm to whom you owe money and place these *together* and *after* the alphabetical listing. These should be *credit* entries.

Do not use a page for more than one account. The total of all the Accounts Receivable should equal the amount posted in the "Accounts Receivable Control." The total of all the Accounts Payable should equal the amount posted in the "Accounts Payable Control."

This is all we have space for this month. Next month we will take a number of typical transactions and show how they are first written in the daily journal and then posted to the correct ledger account. —30—

Within Earshot
(*Continued from page* 4)

no matter *what* the operator does, he *cannot* get across the high-voltage. That includes engineering out interlocks that can be "wired around," covering modulator tube plate caps, as well as designing the R.F. section so that no adjustments to the high voltage section can be made except from the outside and at the end of insulated shafts, etc.

All the text books warn that cathode

●You can make more money by making yourself more valuable!

RADIO & TELEVISION ENGINEERING

Radio holds more than "just a job" for you. Ahead is success and opportunity, but you must have the ability that comes with modern technical training. Remember, every man has the desire to succeed. Only a few really do. Why? Because they fail to plan ahead. Others, like CREI students, follow a tested plan that leads to more money and better radio jobs. Why don't you do the same thing? Then perhaps you'll be ready to step into a job in one of the 300 broadcasting stations and other branches of the industry now employing our men. The story of CREI spare-time training means a lot to you—it costs you nothing. Write for it today.

Send for Free Booklet:
"The CREI Tested Plan"

48 interesting pages with scores of photographs and complete outline and description of CREI radio and television spare-time study courses.

CAPITOL RADIO Engineering Institute
Dept. RN-3, 3224-16th St. N. W., WASH., D. C.

The United States Government, alarmed by reports of increased espionage activities, is determined to protect our national defense secrets from cameras that pry! To get the complete, authentic report on the most sweeping set of restrictions ever imposed in peace-time upon American photographers, read "Unwitting Spies Beware" . . . on page 14 of the March POPULAR PHOTOGRAPHY. This is just one of the many outstanding and brilliantly illustrated features on photography.

in the *MARCH ISSUE* of the
WORLD'S LEADING PHOTOGRAPHIC MAGAZINE

Popular Photography
Now On Sale At All Newsstands

modulation is dangerous; and so it is. Watch the insulation of the modulation transformer, if it should break down there might be trouble,—electrocution trouble.

In the last year only one death was from high-voltage power supplies. MOST OF THEM WERE FROM SPEECH-MODULATOR SECTIONS! The power supply is given a healthy respect by the ops; not so the modulators. Yet they are equally if not more dangerous.

So watch yourself. Be careful. Death is so final!

WE didn't expect the deluge of letters on the so-called "feud" between Messrs. Rider & Bradley on the relative merits of *Signal Tracing* vs. *Catch-as-Catch-Can Servicing,* but we got them! The best letters have been excerpted and appear elsewhere in this issue.

The *Repairmen's Riddles* are going great guns, too. Lee Ward tells us practically all the servicemen had the right answer, but very few knew *why.* This can serve to indicate but one thing; our serviceman is long on experience and somewhat short on theory. Not that we want to start any controversy, but *theory* is important. Never have we forgotten a certain serviceman whom we watched time an again *solve* the trouble without getting up from his desk, with only voltages, resistances, and tube tables in front of him. He'd reason the thing out in theory, and then go to it. He was rarely wrong. He could service a set in nothing flat, and to the best of our knowledge he'll give Rider a run for his money any day, with that worthy fully equipped with "Chanalyst" and he with a book, a voltmeter and an ohmeter.

"Theory," he'd say, "never hurt anyone! The engineers built the set on *theory* and if anything goes out of whack, it can be fixed by *theory!*"

We think he has something there!

THINGS we'll bet you didn't know until you read it here: In the ham bands, both FM and a modulated oscillators are perfectly legal wherever type A-3 emission is permitted. But the FM must be exceed 10,000 cps and the modulated oscillator must stay put and not frequency-modulate beyond the normal band width taken up by the usual phone sig.

Easiest way to test whether your FM or modulated oscillator is legal: get a report from another ham with a crystal-controlled super-het. If he can honestly give you a QSA5, with the crystal "in," you're O.K.

WITH over 20 million sets in the hands of the public, it is small wonder that the serviceman has a hard time of it in giving his customers the best in reception. Except in the big cities, the average set is *not* the latest super-het, still the customer only hears what comes out of the loud speaker. If the tone is good and the set sensi-

IF ITS
RADIO
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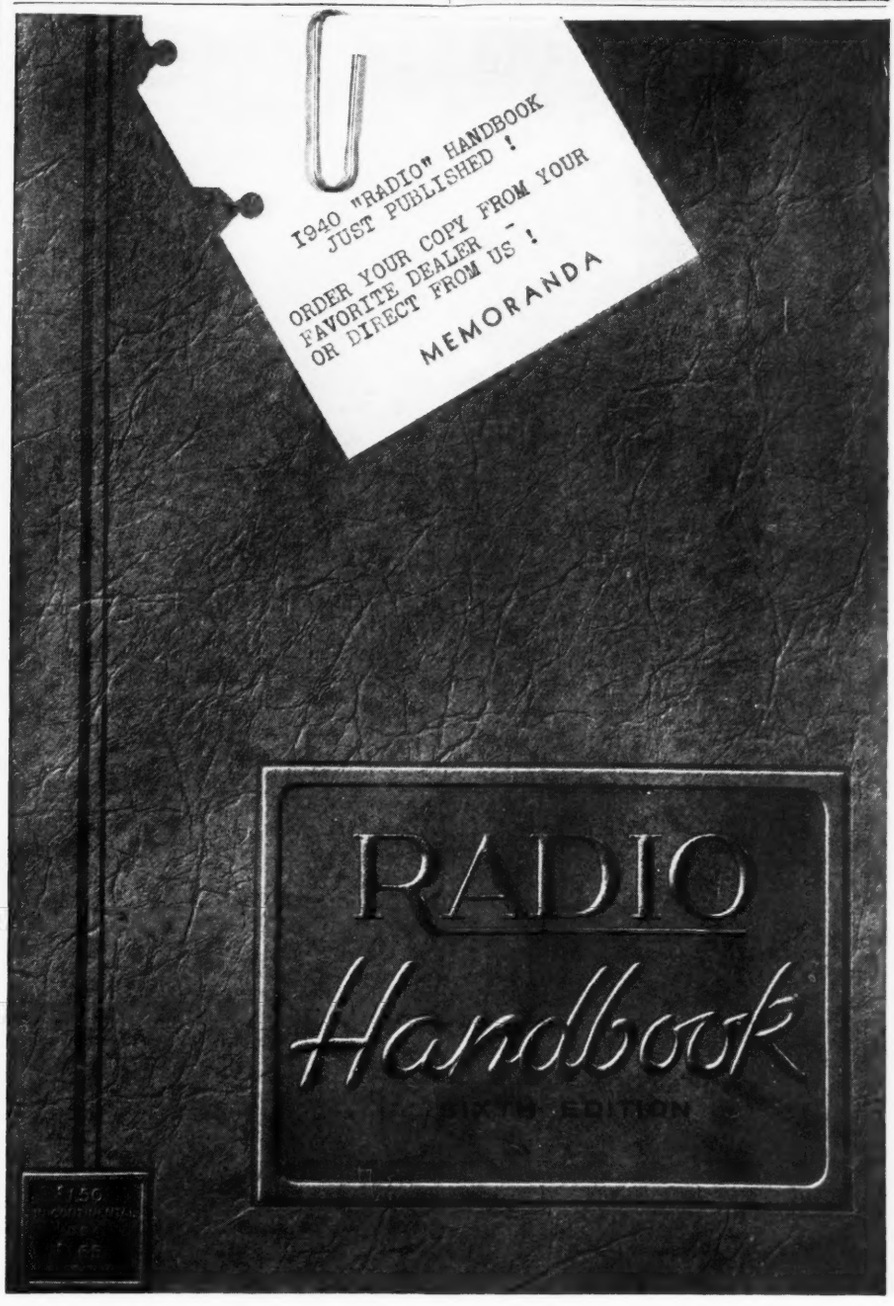

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tive, that usually suffices. But when neither is the case, the serviceman too often tries to sell the customer a new set. Failing in this, he lets the customer leaves the store with a "bad taste" in his mouth, dissatisfied.

There is a solution to this condition which will at once satisfy a customer and make the serviceman some money. The answer is "Modernization." How to do this and when to do it is fully covered by Charles Leutz in his series starting in this issue. We suggest every serviceman follow these articles with care. They may mean a good business to him.

SAY, Mr. Ripley, have you followed our Hamchatter lately? This month we include a lot of *dx* reports sent in by John D. Clark of San Francisco. They are complete and we'd welcome any further reports of any Eastern hams hearing the same stations. By the by, our HC column runs 6000-8000 words per month now. It is the largest column of its kind in the world, thanks to you. If it's ham gossip, you'll see in it *R.N.* Watch *Hamchatter* grow even bigger!

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Well, BCNU next month. 73 de KAK.

Modernizing Receivers
(*Continued from page* 21)

cipal doublets N-S and W-E but also any one of four "V" doublets N-E, E-S, S-W and W-N as well as numerous combinations of straight and "V" doublets. The control switches are each single pole, four position. Each elevated element can be connected to either side of the doublet input coil, grounded or left floating free, the latter two positions for possible advantageous reflector action.

In operating a receiver in connection with the above aerial and switching control, just as soon as the desired signal is first detected, the four selector switches are manipulated to bring the input signal strength to a maximum; the receiver tuning operations are then completed readily. With this antenna arrangement it is often possible to eliminate interference that could not possibly be accomplished by receiver tuning adjustments alone. Furthermore it is often possible to bring in new stations that formerly were not even audible on an ordinary aerial.

Fig. 4b shows a similar arrangement, but designed to cover a directional arc of 150°, rather than all possible directions. "V" doublets are bi-directional and reception is also obtainable in the opposite arc. Where two straight doublets are erected at right angles to each other, the elevated elements may be either ¼ or ½ wavelengths long. However if the "V" aerials are to be used exclusively the horizontal elements should be 1½ wavelengths long,

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for the 90° separation between elements. In Fig. 4b, provided space is available, the elements are separated 50° and then each should be 4 wavelengths long. In referring to wavelength above, it means the band the receiver owner is most interested in. Regardless for what band the aerial is designed, it will of course respond to harmonics of that fundamental. By using the "V" type lead-in (Fig. 4c) the frequency response is further expanded, due to the fact that the characteristic impedence of the "V" lead-in approaches that of the doublet, at the high end, and matches that of the transmission line at the low end of the lead-in. Dimensions are given in Fig. 4a covering the above type aerial suitable for an average all-wave receiver. Fig. 6 shows the switching panel (left).

Where severe interference must be eliminated, a uni-directional antenna is suggested, the design of which depends upon the problem to solve. For maximum receiving efficiency from one given direction, the proper aerial may be a pair of di-poles and reflectors, a long "V" aerial or a rhombic or diamond pattern. Generally speaking a uni-directional aerial not only eliminates at least 75% of all possible signal and noise interference but will also give a pick-up gain in the desired direction of about 1.5.

Fig. 5 illustrates how the signal-to-noise-ratio is tremendously improved by removing the collector elements of the aerial far as possible from the sources of "man made static." Parasitics are invariably highly damped oscillations and diminish rapidly in strength with distance. In the above illustration, the example shows a large apartment house with the receiver located on the first floor. Using a small doublet just outside the apartment window (5a), local noise and average signal strength is about equal. Elevating the aerial to 50′ above ground reduces the noise 50% and improves the signal pick-up 100%. Elevating the aerial to 100′, 30′ above the apartment roof, reduces the noise a total of 75% and increases the average signal strength 300% as compared with the first situation. The original unsatisfactory signal to noise ratio of 1-1 is improved to the very satisfactory ratio of 12/1 and at an expense of 100′ of transmission line.

Out in the suburbs or country, where automobile ignition interference may be severe, and where space is not a limitation, the collector portion of the aerial can be removed 500′ to 1000′ from the highway, if necessary. Where cost is not a first consideration, a low loss coaxial cable can be used in place of a simple transposed lead-in. —30—

Bench Notes

(*Continued from page* 15)

The secondary winding, at some point other than the center tap, was grounded through a high resistance.

One secondary side, in series with

(*Please turn the page*)

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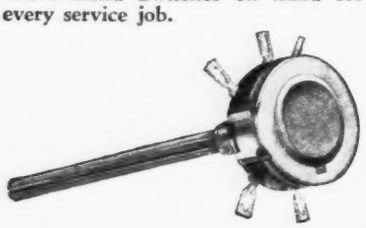

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voltage divider section 2-3, was partially shunted to ground.

Normally, push-pull grids operate 180° out of phase. Because the grounded secondary was in the signal path, the input circuits were unbalanced, resulting in phase displacement and amplitude distortion, which increased with a rise in signal level. Other ancillary effects contributed to the mismatch from detector plate to speaker cone, and added to cause loss of overall gain and increased distortion. The slight reduction in grid bias was, *in itself,* unimportant; *it was merely an indication.* Alone, it would not have resulted in the described faults.

References: Ghirardi's *Radio Physics Course,* pp. 666-72; Rider's *Servicing by Signal Tracing,* pp. 101-3; Terman's *Radio Engineering,* pp. 181-3. Sorry—no correspondence is possible.

The Winnahs!

The first prize—a O-1 d.c. milliameter—was taken by Mr. A. H. Smith, 28 Grant Avenue, White Plains, N. Y.

Ghirardi's *Trouble Shooter's Handbook,* the second prize, goes to Walter Coolidge of 224 Grant Avenue, San Francisco.

Canadian cousin James Moore of Agincourt, Ontario, took third place; fourth was awarded to W. E. Keever, 632 S. Colonial Avenue, Detroit; and the fifth was earned by Laurence Melanson of Marion, North Dakota. Each of these three has been given a year's RADIO NEWS subscription.

Congratulations! Coming out ahead from the great field of starters is something to be proud of; even the runners-up deserve the distinction of notice: John C. Barnhart of Sunbury, Pa.; R. D. Tanney of Hammond, Indiana; Operator H. R. Happoldt of the *SS. Dorchester;* Frank Rapagnini of Chester, Pa., and Thomas B. Owen of Santa Monica, California. Good work came from all these five, but they were just edged out of prize placement.

After the Storm

Entries of particular interest were: those from foreign countries; those in rhyme; the ones from W. L. Marsh, Jr., of the *High Blood Pressure Foundation;* John Hershberger, Observer-in-Charge, *Tucson Magnetic Observatory;* E. H. Fahey, of Clinton's (N.J.) *Soil Conservation Service;* E. M. Beck, of the *Los Angeles Dept. of Water & Power;* and the card from the only woman entrant—Miss Fanny Kawamoto of Honolulu. Alva Redmond's telegram from Jacksonville didn't place, but its delivery recalled my sins for a flash review. Then there was the entry from Second Class Radioman Harris of the *USS. Snapper.* That's right—*Snapper.*

Many answerers, while evidencing an easy familiarity with the technical features, *didn't follow rules.* A surprising number of outsiders entered; I remember reading letters from a florist, druggist, jeweler, plumber, and a confectioner. Amateurs and ship

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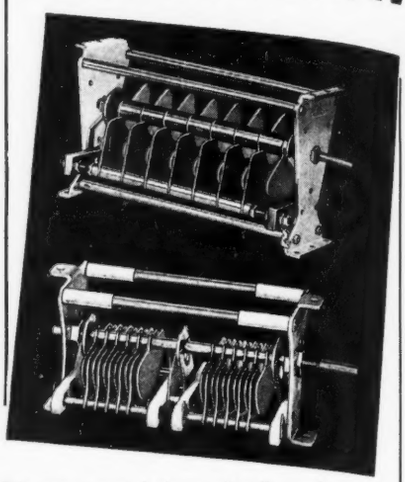

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operators took up the challenge as an escape.

Spanish entries appeared. Although my instruction in foreign language was taken between Bacardis in Havana's *Ambos Mundos,* I was able to translate them. Matter of fact, by the time the farthest-flung solutions began to come in, I could have decoded *anything* involving a *Philco 20*—even in smoke signals!

Don't be discouraged if you didn't win—you were up against *very* tough competition. Riddle No. 5, with more prizes, appears in the next issue. Keep the ol' soldering iron hot!

Remember one thing! First—READ THE CONTEST RULES—all of them. Second—FOLLOW THE CONTEST RULES—all of them. Many an entry lost out on the *first prize* because the rules were NOT followed. Better luck next time! —30—

Construction of a Vernier

(*Continued from page* 23)

shown in figure 1, and we are ready to lay down the vernier divisions on the arc A—A′. Place the protractor on the drawing so that its center lies on that of the arcs, and its 0°-line coincides with the reference line C-C′-C″. By estimation, place a mark on B—B′ opposite the 6°28.8′ reading on the protractor. This point will be very close to the 30′ division between 6 and 7 degrees; a representative example is shown in figure 2. (But *don't* use this *relative* position in any way other than as a *guide* for estimating the distance on the protractor you are *using.*) If you are using a precision protractor, all that is necessary is to set the adjustable arm to the correct reading and proceed accordingly using, of course, the largest-radius arc.

A line is now drawn from C through the point just obtained. It is a matter of simple geometry to see that the division thus made on the arc A—A′ represents the same angle as that on the arc B—B′. We therefore now have the first of the ten required divisions on the vernier.

The other nine divisions are produced by adjusting the spring-bow dividers, or a compass of the same type, to the points of the first division. Then, on the arc A—A′, merely "step off" the remaining number of divisions.

Finishing the job is now a matter of drawing in another arc so as to give the desired width of the vernier, and of drawing two lines to determine its desired overall length. Too, the division lines should be inked in (with india ink) and should be about the same length as used on the main dial. The lines should be slightly less in width than those of the main dial so that the optical illusion will be that both lines are equally heavy. Further dressing-up may be had by inking in the appropriate numbers of the divisions and by adding a border to the job.

After all inking and clean-up erasing is done, the vernier is then trimmed and glued to a piece of heavy cardboard which is in turn trimmed, after the glue has set. The combined thicknesses of the paper and cardboard should be such that the surfaces of the vernier and the main dial will be flush when the vernier is mounted on the panel.

The correct position of the vernier is, of course, obtained by aligning its 0- and 10- lines with two main-dial divisions which differ by 9 points. This condition should also bring the inner arc of the vernier in alignment with the arc of the main dial.

Reading the vernier is a simple matter, with a typical example shown by figure 4. The reading is 215.4. If, however, a dial setting is such that none of the vernier divisions is in alignment with one of the main dial divisions, the closest accurate reading is given by the two lines which most closely coincide. Of course, the difference in their alignment may be estimated, which produces a reading of 5 digits, the fifth being subject to question. This leads to the suggestion that the vernier divisions could be each divided into ten parts, permitting accurate readings to the fifth place.

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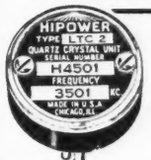

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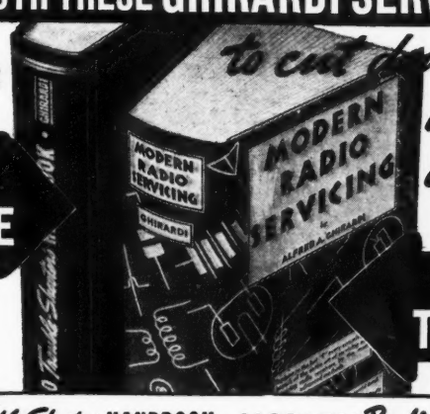

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RADIO NEWS

On Sale March 10th!

As I See It!

(*Continued from page* 10)

group of men cooperate with each other and are friendly, price cutting is at a minimum; cut-throat competition is eliminated.

Taking all things into consideration, the sooner local association groups formulate such a financial guarantee program, the faster will public confidence grow. —30—

Readers' Wrath

(*Continued from page* 22)

that every service man has to develop by hard study of human nature and the possession of a pleasing personality.

We radio men were never born to be good salesmen so it is hard work for us to develop those talents.

The man who uses his wits as well as his brains will get much farther on the road to success, both monetarily and technically. . . .

Hoping this does not end up in the waste basket, I remain,

(Sgd.) Oliver Parsons, Vice-pres.,
St. Joseph Assn. Radio Service Men.

Dear Mr. Editor:

. . . . **"Signal Tracing" vs. "Catch-as Catch-can."**

There is always the tendency of the man who has something to stick up for his own idea, and so with our debate. We really cannot take one system in preference to the other. The ideal method of servicing is to have all systems immediately available, and to choose and use the one best adapted to the particular case in question. The signal tracing idea is an excellent one, and can be applied in many ways with whatever equipment the serviceman has with some advantages in many cases, and to better advantage with proper equipment.

When we have elaborate equipment we are often so anxious to use it that we overlook simple troubles which could be located in a moment without instruments, and which would involve a great deal of work with instruments. Instruments are intended to indicate electrical conditions, not to take the place of brains.

To work intelligently we should first analyze the problem, determine what we are to do, what trouble(s) we are to locate, decide on the probable causes, and then, and not till then, try to track down our trouble. . . .

(Sgd.) Merritt L. Perkins,
Radio Service,
R. F. D. No. 3,
Three Rivers, Mich.

Serviceman's Experiences

(*Continued from page* 18)

After the last delivery Saturday night, I picked up a Sunday *Diatribe*. Al was at the till when I came in, figuring up our salaries, so I sat at the desk and opened the comic section to see if *Terry* had got away from the *Pirates* yet. They hadn't; they were still stuck in the Orient, and still in trouble. One of the sections slid off my lap, and I glanced at the first page.

"Al—*look!*" I screamed.

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MICHIGAN AT CONGRESS GEO. H. MINK, *Manager*

"Holy cats!!" he was forced to admit.

The picture showed Vincent working at his test bench, and wearing a needlessly conspicuous *Redoubtable Radio* smock. Above the picture was a line reading *LINEMEN OF THE ETHER,* and below it, an article headed: "Professionals at Work," by James Johnson. Two solid columns were used to describe Vin, his shop, his work. What a plug! What an ad! We both stood there, feeling foolish.

Now comes the part I like to remember.

I glanced furtively at Al to see if there was any argument left in him. There wasn't. He just stooped over, raised his coat, and said:

"Lee, do me a favor!"

I did him the favor.

—30—

QRD? de Gy

(*Continued from page* 25)

gically located offices throughout the country, aided by seven monitoring stations. The task of running these stations and conducting inspections of all radio stations, including American and foreign ship installations, falls upon a staff of civil service selected inspectors totaling 115.

WE wish to take this opportunity of thanking you guys and gals who sent us *Xmas* greetings and to wish you-all plenty of the best for this coming year. May 1940 be your year with good health, prosperity and a lot of happiness. We pray that the world's troubles be straightened out so that American shipping will continue to flow as freely as before and more berths will be opened. So, ge, es 73—de GY. —30—

Beginner's Receiver

(*Continued from page* 41)

substitute a 6F6 for the 89. The only changes necessary are an octal socket and a 500 ohm 10 watt resistor for the 1000 ohm 2 watt resistor used with the 89.

Regeneration will occur with the control set about half-way on. Should the receiver oscillate too violently the cathode tap should be moved closer to the grounded end of the coil. Experimenting with the cathode taps and trying different values of grid leaks will give good results. DX constantly rolls in and a large amount of audio power is available. All in all, any person duplicating the construction of this set will find it well worth his while.

Coil Data

20 meter band: 8 turns spaced to 1½". Cathode tap 2½ turns up from grounded end.

40 meter band: 16 turns spaced to 1¾". Cathode tap 4 turns up from grounded end.

80 meter band: 31 turns close wound. Cathode tap 6½ turns up from grounded end.

All coils are wound on 1½" diameter plug-in forms with No. 22 d.c.c. wire.

—30—

Tops Technically! RADIO NEWS 25c

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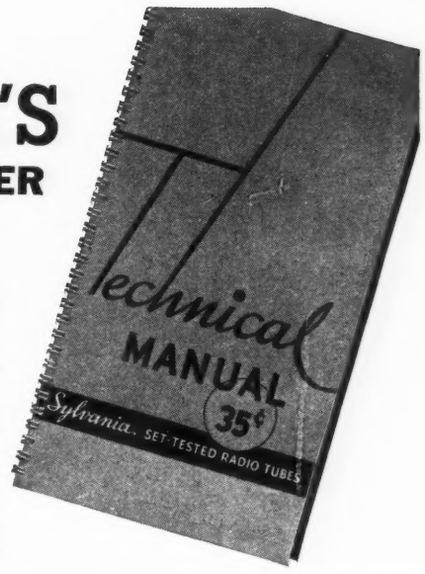

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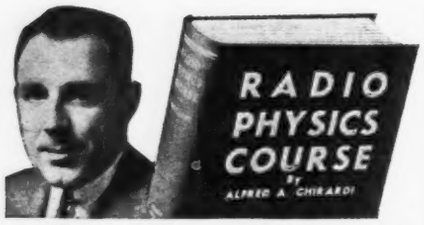

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RADIO PHYSICS COURSE

by Alfred A. Ghirardi

(Continued from February issue)

Artificial magnets: If a piece of hard steel be stroked continuously in the same direction with a piece of lodestone it will be found that the steel also becomes magnetized. If it is suspended by a piece of thread it will always point in a north and south direction. If it is dipped into a quantity of iron filings, small iron tacks or nails, and withdrawn, the filings or nails will adhere to it, particularly at two well defined points. These points are called the *poles* of the magnet. They are the places on the magnet where lines of magnetic force either enter or leave it. The pole which always points to the north magnetic pole of the earth when the magnet is suspended freely, is called the *north seeking,* or simply the *north* (N) pole of the magnet. The other is called the *south* pole (S).

The earth itself is a great big magnet, with its magnetic poles lying within short distances of the true north and south geographical poles of the earth.

This property of attracting iron and steel is called *magnetism,* and the body possessing it is called a magnet. Natural magnets are not used commercially now, because many alloys of iron have been developed which make stronger and more satisfactory magnets than these. Also, artificial magnets are no longer magnetized by stroking them with lodestone, but, as we shall see later, they are now magnetized very powerfully by inserting them in coils of insulated wire through which electric currents are sent.

Laws of attraction and repulsion: If two bar magnets made of hard steel are freely suspended by a string, one at a time, their north and south poles can be determined by noticing which end points toward the north pole of the earth in each case. These poles can then be marked on the magnets. Now if the north pole of one magnet is brought near the north pole of the other, they will be found to exert a force of repulsion between each other. If the south pole of one is brought near the south pole of the other, repulsion will take place again. If the south pole of one is brought near the north pole of the other, a force of attraction will draw them together. The same action will take place if north pole of the first is brought near the south pole of the other.

(To be continued)

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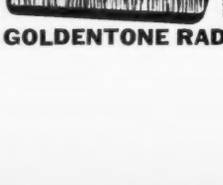

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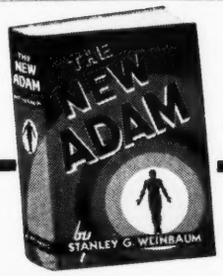

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Video Reporter

(*Continued from page 37*)

Your Video Reporter, attired in his best bib and tuck, hied to the Waldorf that night to observe the most pretentious indoor telecasting attempt to date. It was a grand show in the ballroom. The cumbersome pickup equipment, including powerful studio lights, iconoscopes, microphone booms, et al., gave the party one of the most unique decorative themes a New York social event ever saw. A top-notch variety bill and fashion show went on before the television cameras. It was great at the sending end. But one of our look-and-listening friends who observed the proceedings on his television receiver a considerable distance away reported that the "over the air" results were none too pleasing. But, once again, here was an event that did contribute to video advancement. It is obvious that the *NBC* production and engineering lads learned much through the experience and better results are anticipated the next time a portable studio is erected at a point remote from the transmitter. —30—

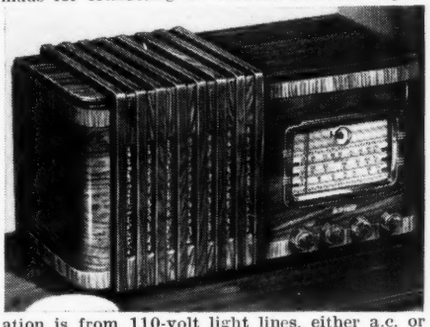
What's New in Radio

(*Continued from page 29*)

pany, 500 West Huron Street, Chicago, present a new stream-lined 20 Watt amplifier. Contrasting green bands on polished steel with a background of gray wrinkle result in a cabinet of beauty. The 20 Watt rating is conservative, the frequency response is exceptional, being ± 1 db. from 30 C. P. S. to 15,000 C. P. S. Inputs are provided for two microphones and one phono or r.f. tuner. All may be mixed and controlled independently. Catalog No. 600-D is now available from the above company and describes the amplifier in detail.

A deluxe table model superheterodyne which meets every requirement of the average listener and which incorporates many features usually found in consoles, is the Lafayette Model D-33, just announced by Radio Wire Television Inc. (formerly Wholesale Radio Service Co., Inc.), 100 Sixth Avenue, New York City.

In a cabinet of selected woods of contrasting grain, 18¼ inches wide, 10¼ inches high and 9 inches deep, this receiver is highly appropriate either for table or mantel mounting. The "Antenn-aire" built-in loop antenna permits perfect "local" station broadcast reception without any external wire connections but for distant station and all short-wave reception provision is made for connecting an external antenna. Operation is from 110-volt light lines, either a.c. or d.c. and for a few cents extra provision is included for 220-volt operation.



The tuning range, in 3 bands, includes 540-1650 kc., 2.2-7 mc. and 7.5-24 mc. Tuning is simplified through use of a slide-rule dial, illuminated and fully calibrated; also an electron "eye" tuning indicator. The 6-inch dynamic speaker, carefully matched to its inclosure, provides attractive tone quality which is variable in three steps. Tips, jacks and switch permit connection for phono or television sound reproduction.

The seven tubes include: 6SA7GT, 6SK7GT, 6P5GT, 6SQ7GT, 25L6GT, 25Z6GT rectifier and a 6U5 "eye."

(*Please turn the page*)

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Why Many Radio Technicians Make $30, $40, $50 a week

Radio broadcasting stations employ engineers, operators, technicians. Radio manufacturers employ testers, inspectors, foremen, servicemen in good-pay jobs. Radio jobbers, dealers employ installation and servicemen. Many Radio Technicians open their own Radio sales and repair businesses and make $30, $40, $50 a week. Others hold their regular jobs and make $5 to $10 a week fixing Radios in spare time. Automobile, police, aviation, commercial Radio; loudspeaker systems, electronic devices are other fields offering opportunities for which N. R. I. gives the required knowledge of Radio. Television promises to open good jobs soon.

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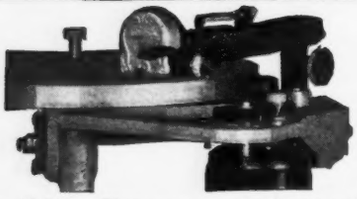

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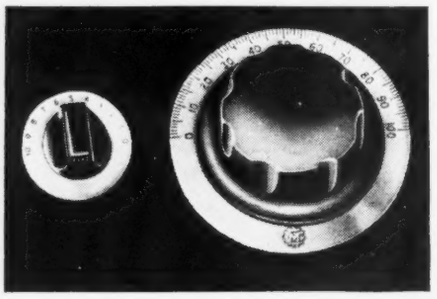
(*Continued from page* 61)

James Millen, in keeping with his policy of quality merchandise, has included a large selection of various types of dials, suited for all amateur needs. Two of the most popular types are illustrated herewith.

The heavy gauge nickel silver dials are of conventional style but with improved type knobs for use with series 14000, 13000 and 12000 condensers and associated equipment. Knobs are molded with large diameter solid bakelite hub



which definitely insulates metal scales from instrument shaft. This feature is extremely important, from a safety angle. When used on receivers the shape of this new style knob will be found more desirable than others heretofore available. They make for comfortable, easy, and accurate tuning.

Many others are included in the Millen catalog, a copy of which may be had by dropping a card to the Millen Mfg. Co., Malden, Mass.

The Turner Co. of Cedar Rapids, Iowa, is offering a new Crystal Microphone, 33X, which has a 25 foot removable cable set, and 90° tilting head for semi- and non-directional operation.

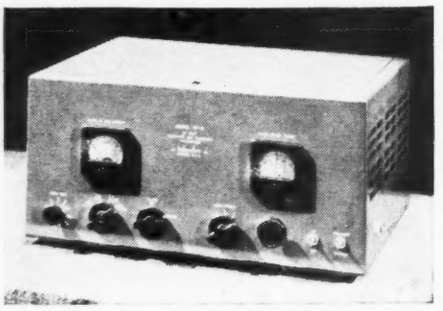
Model 33X has a response of 30-10,000 cycles, free from peaks, and the model has remarkably low feedback. The crystal is impregnated against moisture, and is blast proof. Finished in a handsome, rich satin chrome, 33X is streamlined for modern beauty.

This microphones is particularly well adapted to P.A. and recorder work, and ideal for the amateur. It has a high output of —52DB, on a wide range of frequencies. The advanced engineering style and trouble-free performance is making Turner 33X a popular microphone with all. It is licensed under patents of The Brush Development Co. The new Turner Microphone catalog may be had by writing The Turner Co., 908 17th St. N. E., Cedar Rapids, Iowa.

The Hallicrafters, Inc., 2611 South Indiana Avenue, Chicago, provide in their *HT-6 Model* a transmitter which offers many advantages for the modern ham station. Instant band-switching is provided for selection of any one of three amateur bands. In addition it may be set up for any of the other amateur bands. The equipment may be operated on any band from 5 to 160 meters inclusive, providing 30 watts output, except on 5-meters, where it is slightly less.

The entire rig including the complete audio system and power supplies, is housed in a table mounting metal cabinet 20" x 9" x 15", only about the size of a regular communications receiver.

Plug-in coil units are used throughout and all exciter circuits are pretuned upon instal-



lation. Thereafter when switching from band to band only the final tank circuit need be resonated as this tuning condenser is used with all final tank coils.

The r.f. line-up for operating on the four lower ham bands consists of a 6L6 oscillator working straight through and driving the 807 (or RK 39) final amplifier. When set up for 10-meter operation the oscillator plug-in unit provides Tri-Tet doubling in the 6L6. For 5-meter operation the plug-in unit includes a separate 6J5 oscillator and the 6L6 becomes a doubler. All plug-in coil units except the final tanks include their own air tuning condensers and are individually shielded with the tuning knobs projecting out through the shield cans.

Provision is made for either crystal or ECO operation on all bands from 20 to 160 meters, inclusive. For ECO operation it is only necessary to plug the appropriate ECO tuning unit into the "crystal" socket. These ECO units are designed for the utmost stability even to the extent of including temperature compensated components. Further contributing to this frequency stability is the

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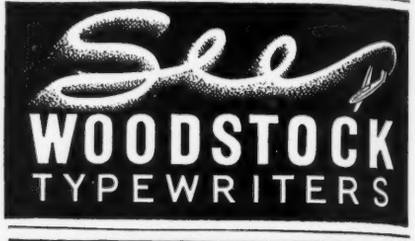

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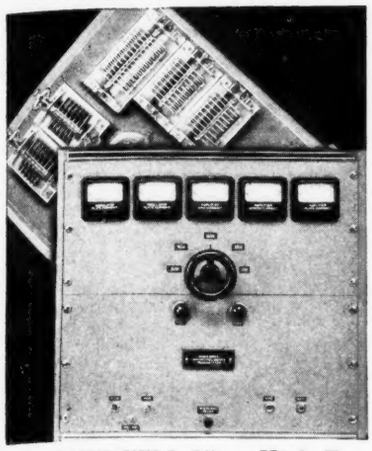

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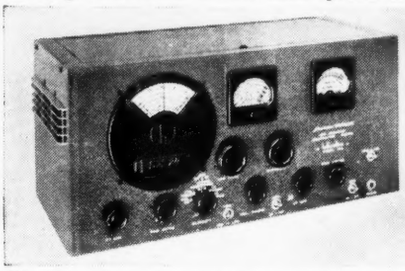
fact that ECO units work at half the output frequency, thus minimizing tuning interaction.

The Hallicrafters Model SX24 "Defiant" has remarkable freedom from oscillator drift, and has a fully calibrated bandspread dial in the 10, 20, 40 and 80-meter bands.

The tuning stability eliminates the need for a warming up period. This is achieved through the use of temperature compensated capacity so designed as accurately to offset the frequency variations which normally take place as the tube warms up, and also the slower variations contributed by the coil as it warms up. In addition to this, a unique oscillator circuit, in which the plate is tuned and the tickler is in the grid circuit, provides independence of line voltage variations so that oscillator drift at 20-meters amounts to only 30 cycles per volt change in the line, says the manufacturer.

Band-spreading is of the electrical type so that any small part of any one of the four tuning ranges can be spread over the entire 360-degree rotation of the band-spread dial.



The receiver has a separate frequency calibration for each of the ham bands from 10 to 80 meters inclusive which permit accurate adjustment of 1 kc. at 20 meters and approximately 5 kc. at 10 meters.

The built-in and illuminated signal-strength meter is calibrated in "S" units and decibels.

The automatic noise limiter is extremely effective in minimizing interference from car ignition systems and other similar types of noise. It functions through the valve action of the diode which permits noise pulses to be by-passed to ground.

The 9-tube line-up includes: 6SK7-r.f., 6K8-oscillator and mixer, 6SK7's in two i.f. stages, 6SQ7 as detector-first audio-a.v.c., 6H6-automatic noise limiter, 6F6-power output, 76-b.f.o. and 80 rectifier. —30—

Unicontrol Transmitter

(*Continued from page 9*)

the transmitter, the builder should acquire *all* the necessary parts that he will need. This is true because so very many alterations and "conversions" will have to be made to enable the manufacturers' parts to fit into the small space allotted. Unless such "conversions" are made, the whole purpose of the transmitter fails, and the unit becomes "just another ham rig," and not the compact commercial-looking, table-mounting transmitter which the authors designed. So with all the components at hand the "changes" can be started.

Take first the power transformer. It is to be mounted "half-shell" style to conserve height as mentioned above. To convert it remove the four bolts that hold the shell to the windings, and also remove the ceramic insulators from the *secondary*, or high-voltage, side of the shell. Remove all bolts from the leads. Next solder a heavy lead to each of the primary leads found in the transformer, and heavy insulated leads to the short secondary leads. These are to end in *Millen* tube caps of isolantite. With a file or a hack-saw remove the mounting

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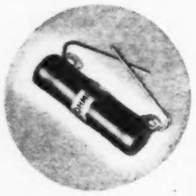

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lips of the shell. Place the *secondary* leads through the ceramic insulator which formerly was the *primary* input side. This now becomes your secondary, or rectifier tube leads. In the former secondary side of the shell, drill three ½" holes in the former top. Insert rubber grommets. You will bring out your heavily insulated primary leads through these insulated holes *after* you have placed the transformer in position but *before* you bolt it down. The center-tap lead is brought over the core and inside the shell through to the primary side so that the ground lead will eventually appear on the under chassis side of the transformer. The lead will be brought through the one remaining hole which you have previously drilled in the "old" primary side. As you finish the "conversion" you will find the rectifier leads coming through the ceramic insulator of the former primary side, while the center-tap and the primary leads come through the holes you have drilled in the former primary side. The transformer is, of course, turned over before being re-inserted into its shell and bolted to the chassis in half-shell mounted style. The illustrations will help in visualizing the "conversion," After the power transformer has been converted, it may be mounted in the large hole previously cut in the chassis.

Next the modulation transformer is to be converted. When this will have been finished, the other transformers will not have to be opened, only minor shell alterations will have to be effected. So the modulation transformer presents the last big "conversion." Remove the shell from the transformer by filing the four corner lugs which hold the bakelite insert to the shell. Force the bakelite out of the transformer shell, and the transformer should come apart easily. Caution: Do not unsolder the leads before removing the bakelite piece and opening the transformer, or else you may lose track of the numbers assigned to the leads and be unable to hook the transformer up in proper sequence. Having removed the transformer from its shell, file or hack-saw off the mounting lips. Fashion two ¼" bakelite pieces to cover the holes in the transformer shell where the other bakelite piece was set. Make your ¼" bakelite of such a size that it covers the whole side of the transformer, and do not attempt to *insert* it under the shell itself. Drill four holes in the corners of the bakelite to mount it on the shell, and in one piece drill two evenly spaced ⅜" holes for the leads to the RCA 811 plates, and in the other drill five ⅜" holes evenly spaced for the output under chassis leads. Connect up the transformer as listed in the parts list under the circuit diagram, and solder heavily insulated leads to the proper ends, so that you will have two leads on one side for the plates of the RCA 811's (input) and five for the 4 leads (output) and the center tap on the other side. Bring the center tap lead over to the output side in the same manner as you did with the

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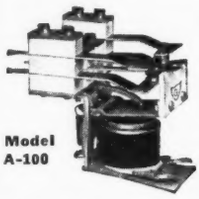

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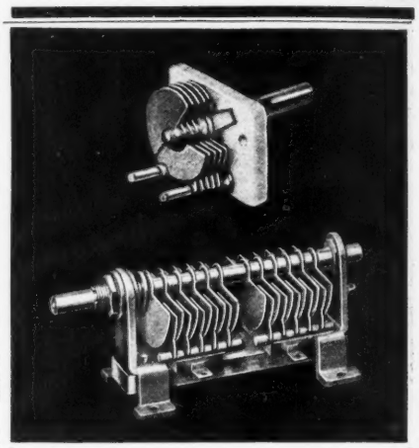

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power transformer. After the bakelite pieces have been bolted to the transformer shells, the transformer can be mounted "half-shell" style in the hole cut for it, the ends put into position and the unit bolted down. Here, again, the illustration will serve to help in visualizing the "conversion."

All flanges are removed from the 5 v. fil. transformer to make mounting more convenient for the position selected. Two spade lugs are soldered to the *Aerovox* filter condenser that mounts above the chassis and the terminals are underslung through cutouts in the chassis. Angle brackets are added to the 6.3 volt filament transformer so that it may be mounted on the rear edge of the chassis as shown.

When parts are wired close together, the importance of using sufficient insulation becomes more and more exact. Automotive ignition cable makes excellent leads for high-voltage work and Consolidated Wire type 4027 was used. These leads are used wherever any voltage in excess of 500 is used. Filament leads are covered with thick walled spaghetti tubing, not because the voltage is dangerous, but as a safeguard against breakdown where sharp bends must be made in the wiring.

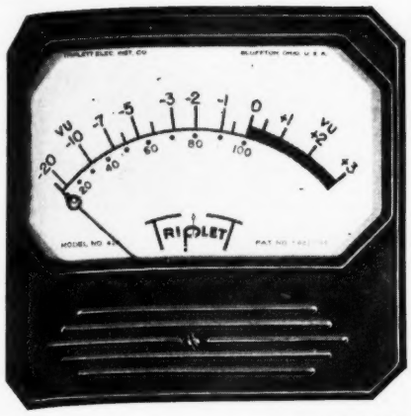
All of the high-voltage filter condensers are connected in such a manner as to permit each lead to be soldered as close to the terminal as possible and the units are further equipped with *Sprague* "Lifeguards" that slip over each terminal. Inasmuch as the highest potential in the transmitter is the discharge surge when the load is removed from the filters, this precaution is desirable.

All relays in the schematic diagram are shown in the *c. w. position.* When phone operation is used, the relays are closed and apply plate potential to the proper circuits.

A push-to-talk relay is provided which adds greatly to the operating ease of the transmitter. Most microphone manufacturers include units which are equipped with push switches for this type of operation, but these are not of sufficient current-carrying capacity to allow control of the circuits and therefore it becomes necessary to utilize additional contacts, such as are provided by the relay.

A *Guardian* overload relay offers protection to the transmitting tubes if the output tank should become detuned from resonance. The resistor across the relay coil is adjustable, and may be set so that the contacts will open at about 200 M.A. This unit may be seen mounted on the front edge of the chassis with the reset knob protruding within easy reach of the operator.

The large *Ward-Leonard* relay shown mounted underneath the chassis controls the high-voltage circuits. Originally it is an antenna relay, here used as a D.P.D.T. relay. The micalex insulation offers ample insulation to the voltage used. Details of connecting the relays are clearly shown and will present no difficulty to the constructor.



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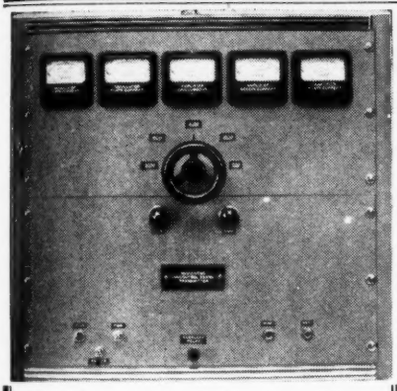

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Note the businesslike -09 rectangular-can series shown above. In 600, 1000, 1500, 2000, 2500, 3000, 4000 and 5000 v. D.C.W., 1 to 4 mfd. Attractively priced, yet truly commercial-grade equipment. But if space and pocketbook are cramped, there's the inverted-screw-mounting -10 series (center) in 600, 1000, and 1500 v., .5 to 4 mfd.

Then there's the ever-popular -05 series round-can job, now available in 600, 1000, 1500, 2000, 2500 and 3000 v., 1 to 4 mfd. No better value has ever been offered in genuine oil-filled high-voltage units.

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The tube lineup of the speech amplifier is as follows: RCA 6SJ7 microphone amplifier, RCA 6L6 driver, RCA 6H6 rectifier for the compression circuit, and push-pull RCA 811 Class B modulators. The suppressor grid of the 6SJ7 is used as a control grid. Rectified audio is fed into this grid in such a manner as actually to control the gain of the tube, and consequently, the amount of audio that may be applied to the 6L6 driver grid.

A conventional audio gain control is provided at the input for the microphone. Audio filtering is provided by R10 and R15 in conjunction with C10 and C30. The input grid leads must be carefully shielded to eliminate hum pickup in the high-gain stage.

A pair of RCA 811's are used in Class B as modulators. In order to reduce the number of power supply parts, in order to achieve compactness, we elected to use a common power supply for both the final amplifier and the modulators, as described above.

In addition, fixed-bias is taken from the center tap of the plate transformer. The potential applied to the grid will depend upon the voltage drop across R20. This should be adjusted so that 100 volts negative potential is applied to the grid of the 828. Be sure to watch the polarity of condenser C39 and connect as indicated.

Bias to the 811 modulators is furnished by two 4½ volt C batteries, as this is more practical than taking voltage from a bias resistor. In order to operate the modulators at the same potential as the class C amplifier, bias is used to limit the idling current to a safe value.

Further effective performance may be had by eliminating the screen dropping resistor to the 828 screen. Both the screen and the plate are modulated and the only difference from the conventional method is to divide the secondary of the modulation transformer into two separate channels, applying correct voltage to each winding. The full 1400 to 1500 volts are applied to the 828 plate, while the screen receives 400 volts from the low-voltage plate supply.

The modulation transformer used provides an accurate impedance match to both the screen and plate of the 828 when connected as specified in the parts list. The amount of current through the secondary is less than by using the usual method of a dropping resistor and permits a smaller unit to be used. Instructions for converting this transformer have been given previously.

One thing is certain, the rig cannot be "thrown" together. It will require painstaking effort and close attention to details. As you wire, remember the use to which the particular wire you are working on, will be put. If it is a high-voltage lead, treat it as such. Use the best possible parts obtainable, especially in the hardware and ceramic departments. This rig is going to be really compact and there will be trouble in servicing it, should something break down *due to carelessness*, or cheapness of components. Follow the illustrations carefully. The wiring has been omitted from these because the placing of the parts is that much more clear. Tie your wires down in the best approved "Western Electric" manner. The authors used much of the parts that are manufactured by *James Millen*, since they seemed to fit the situation better.

Next month the description will be limited to the construction of the r.f. chassis, the band-switching mechanism, and tuning procedure.

If *all* the instructions are carefully followed, there is not the slightest doubt but that the builder will possess a "commercial" rig, with all that that name implies. -30-

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It pays to buy RCA's for real economy.

Ask your RCA distributor for November Ham Tips containing complete construction article on RCA-812 Transmitter shown in December QST.

Manufacturer's Tube Type	Tube Classification	Plate Dissipation # Watts ●	D-C Plate Input # Watts ●	Amateur Net Price ●	Watts Input Per $ □	Ratio of Watts Input Per $ Competitive Type To RCA Type (%) ▲
RCA-802	Pentode	13	33	$3.50	9.44	100
Tube A	Pentode	10	27.5	4.50	6.11	65
Tube B	Pentode	10	27.5	3.95	6.95	74
RCA-804	Pentode	50	150	15.00	10.0	100
Tube A	Pentode	40	120	15.00	8.0	80
RCA-806	Triode	225	1000	22.00	45.5	100
Tube A	Triode	200	750	22.00	34.1	75
Tube B	Triode	200	875	21.50	40.7	89
Tube C	Triode	200	750	18.50	40.5	89
Tube D	Triode	150	600	15.00	40.0	88
Tube E	Triode	250	1050	24.50	42.9	94
Tube F	Triode	150	1000	24.50	40.8	89
RCA-807	Beam Tetrode	30	75	3.50	21.4	100
Tube A	Beam Tetrode	25	60	3.50	17.2	80
Tube B	Beam Tetrode	25	60	3.00	20.0	93
RCA-809	Triode	30	100	2.50	40.0	100
Tube A	Triode	25	79	2.50	31.6	79
Tube B	Triode	20	56	2.25	24.9	62
Tube C	Triode	25	112	3.50	32.0	80
RCA-810	Triode	150	620	13.50	46.0	100
Tube A	Triode	125	400	13.50	29.6	64
Tube B	Triode	150	600	15.00	40.0	87
Tube C	Triode	100	400	13.50	29.6	64
Tube D	Triode	125	315	13.50	23.4	51
Tube E	Triode	100	500	12.50	40.0	87
RCA-811/812	Triode	55	225	3.50	64.3	100
Tube A	Triode	40	115	3.50	32.8	51
Tube B	Triode	55	225	6.00	37.5	58
Tube C	Triode	60	225	6.95	32.4	50
Tube D	Triode	50	260	6.75	38.5	60
Tube E	Triode	70	300	6.00	50.0	78
Tube F	Triode	50	225	6.95	32.4	50
Tube G	Triode	65	175	3.95	44.3	69
Tube H	Triode	65	175	3.95	44.3	69
RCA-814	Beam Tetrode	65	225	17.50	12.85	100
Tube A	Beam Tetrode	50	170	17.50	9.72	75

\# Class C telegraph ratings—ICAS values used for RCA types.
● Data based on published values as of Oct. 15, 1939.
□ Factor W/in has value shown in fourth column.
▲ Approximate.

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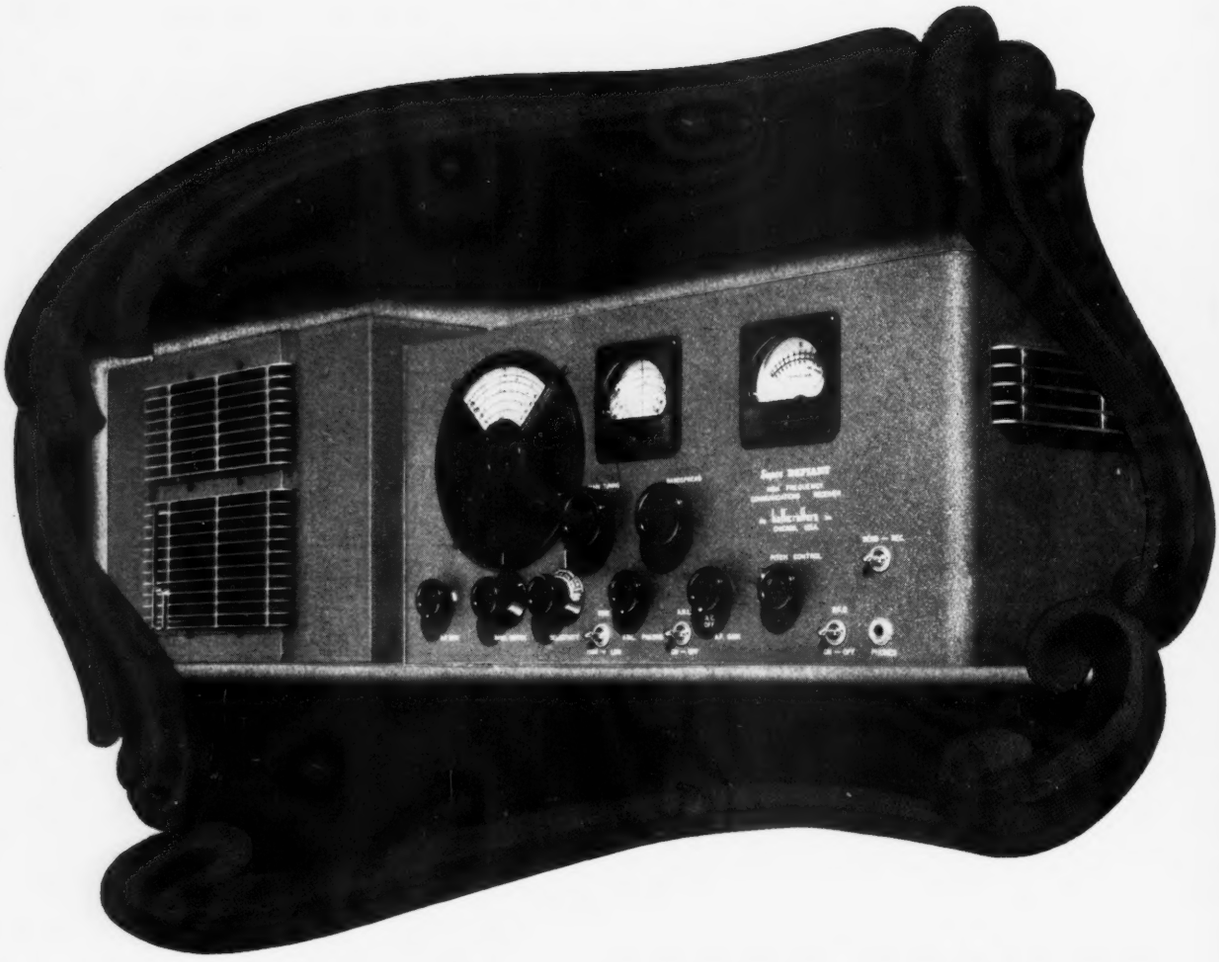

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